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Research Article

Brief Intervention for Smokeless Tobacco Users by Dentist

G. Shanti, Ajay Bhambal, Sudhanshu Saxena

Department of Preventive & Community Dentistry, People's College of Dental Sciences & Research Centre, People's Campus Bhanpur, Bhopal-462037.

Abstract:

The dental team has an important role to play in tobacco cessation and counselling. The present study was conducted to evaluate the effectiveness of the brief intervention for smokeless tobacco users as a longitudinal study. Ninty patients who were assessed to be in the Pre contemplation phase based on the Transtheoretical model, were included in the study. The nicotine dependence was graded according to Talwar et al (2004). Their follow up was done for 1 year. During the inception of the study all the participants showed heavy nicotine dependence. By the end of one year 10 males and 19 females became light nicotine dependent. Our study showed a reduction of 32% in the prevalence of tobacco use after the implementation of the programme using the "5 A" model.

Key Words: Dentist, Transtheoretical model, Tobacco cessation.

Introduction:

Although tobacco death rarely makes headlines, tobacco kills one person every six seconds. (Monaghan, 2002). The WHO report of 2009 on the global tobacco epidemic states that tobacco use kills more than 5 million people worldwide each year and this number is expected to grow. If the current trend persists, tobacco will kill more than 8 million people worldwide each year by the year 2030, with 80% of these premature deaths in developing countries. By the end of this century, tobacco may kill a billion people or more unless urgent action is taken (WHO, 2009).

Despite increased research on smoking, heightened awareness of the consequences of smoking, and considerable publicity about litigation against tobacco companies, statistics published indicate that, overall incidence in India in the population aged 10 years and above, 43% of rural and 28% of urban males are regular tobacco users. Among females, the prevalence in rural areas is 11% and in urban areas it is 5%. It is evident that rural prevalence is higher than urban prevalence for both males and females and overall prevalence is higher in males than in females (Reddy & Gupta, 2004).

Satyanaryana et al (2007) compared the cumulative risk of tobacco related cancers (TRC) in various cities of India and found Bhopal city in Madhya Pradesh to have the highest ratio of tobacco related cancers as compared to all other cancers in males (56.9%). The cumulative risk of tobacco related cancers among males was 3.82% and females was 1.15%. So the risk of developing tobacco related cancer is 1 out of 26 in males and 1 out of 87 in females in Bhopal (Satyanaryana et al, 2007).

The term smokeless tobacco is used to describe tobacco which is consumed without heating or burning at the time of use. Varieties of smokeless tobacco products have been produced on a large scale, commercially marketed and are available in small plastic and aluminum foil packets (Reddy & Gupta, 2004).

The National lung health education programme (Doherty et al, 2002) states that the physician and his or her staff can significantly increase rates of smoking cessation with simple and brief office based programmes which would be part of brief interventions. The elements of such a plan should include the following:

- Document smoking history in the chart of all the patients.
- Motivate quitting.
- Ask about smoking with each encounter and advise to quit.
- Offer referral for counselling.
- Offer pharmacotherapy.

Some patients are also motivated to quit by a telephonic call or a personal letter from their physician with "how to quit literature".

The Transtheoretical model or Stages of change model, has become an influential theoretical model within the discipline of health psychology. The model represents a motivational readiness and continuum of changes in unhealthy behaviour (West, 2005).

Once smokers are identified, it is essential to determine their level of readiness to quit. Failure to do so is one of the major reasons because of which interventions are unsuccessful as individuals are more receptive to interventions tailored to their particular needs, while ignoring those that are irrelevant.

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The dental team has an important role to play in tobacco cessation and counselling. With this background the current study was conducted to evaluate the effectiveness of the brief intervention for smokeless tobacco users by the dentist using the '5 A' Model (Shah et al, 2006).

Material and Methods:

Patients who had come to the Department of Preventive & Community Dentistry with various problems like carious tooth, gum problems but had the habit of chewing smokeless tobacco were selected randomly in 2 months period for this study. The study participants who were assessed to be in the Pre-contemplation phase based on the Transtheoretical model were included in the study (Fig. I).

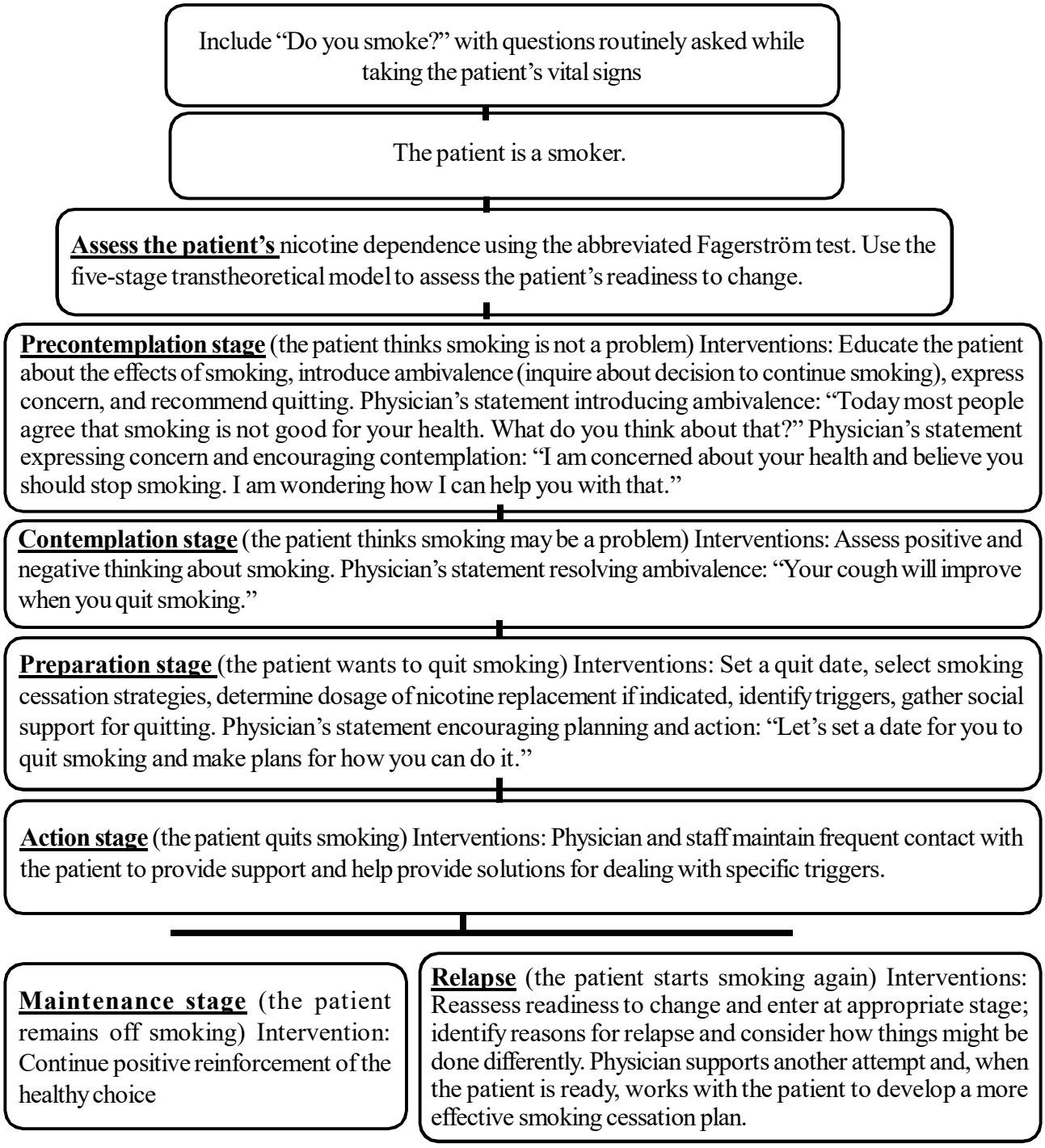

Include "Do you smoke?" with questions routinely asked while taking the patient's vital signs
The patient is a smoker.
Assess the patient's nicotine dependence using the abbreviated Fagerström test. Use the five-stage transtheoretical model to assess the patient's readiness to change.
Precontemplation stage (the patient thinks smoking is not a problem) Interventions: Educate the patient about the effects of smoking, introduce ambivalence (inquire about decision to continue smoking), express concern, and recommend quitting. Physician's statement introducing ambivalence: "Today most people agree that smoking is not good for your health. What do you think about that?" Physician's statement expressing concern and encouraging contemplation: "I am concerned about your health and believe you should stop smoking. I am wondering how I can help you with that."
Contemplation stage (the patient thinks smoking may be a problem) Interventions: Assess positive and negative thinking about smoking. Physician's statement resolving ambivalence: "Your cough will improve when you quit smoking."
Preparation stage (the patient wants to quit smoking) Interventions: Set a quit date, select smoking cessation strategies, determine dosage of nicotine replacement if indicated, identify triggers, gather social support for quitting. Physician's statement encouraging planning and action: "Let's set a date for you to quit smoking and make plans for how you can do it."
Action stage (the patient quits smoking) Interventions: Physician and staff maintain frequent contact with the patient to provide support and help provide solutions for dealing with specific triggers.
Maintenance stage (the patient remains off smoking) Intervention: Continue positive reinforcement of the healthy choice
Relapse (the patient starts smoking again) Interventions: Reassess readiness to change and enter at appropriate stage; identify reasons for relapse and consider how things might be done differently. Physician supports another attempt and, when the patient is ready, works with the patient to develop a more effective smoking cessation plan.

Fig. I: Transtheoretical model for readiness to change for a smoker (Mallin, 2002).

The participants were asked about their age, smoking status and willingness to participate in the project about healthy behaviour and disease prevention. They were asked to read and sign an informed consent form. The study participant's tobacco habit was assessed based on nicotine dependence. The nicotine dependence was graded according to Talwar et al (2004) as given below:

1. **High level of dependence**: Individual who uses tobacco within 30 minutes of waking up or who uses it 25 or more times per day.
2. **Moderate level of dependence**: Individual who uses tobacco more than 30 minutes after waking up or uses it less than 25 times per day.
3. **Low level of dependence**: Those who neither uses tobacco before 30 minutes of waking nor use it more than 25 times a day.

The tobacco dependence was assessed at the beginning and at the end of one year in the study. 5 A's method (Fig. II) was the intervention that was used for all the participants. No pharmacological treatment was provided for the tobacco users.Frequencies and percentages were calculated and Chi-square Test was applied in order to test for association in males & females among the various variables. The statistical analysis was done using SPSS version 11.5.

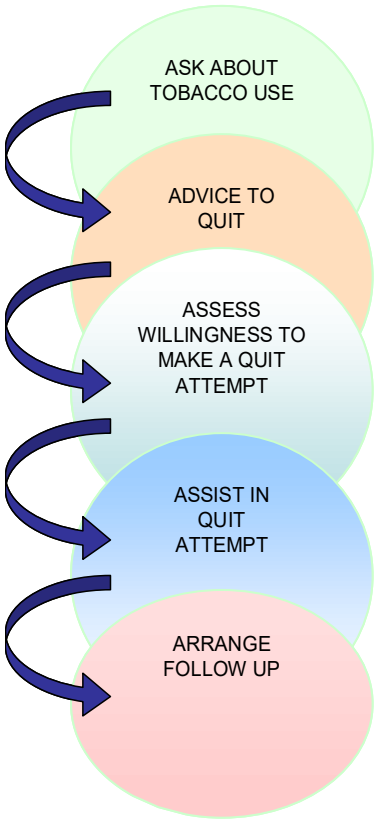


Fig. II: Showing the '5 A' Model.

Results:

There were 90 participants in the study, of which 45 were males and 45 females. Their follow up was done for 1 year. All participants had the habit of tobacco chewing at enrollment. 52.2% and 47.8% participants belonged to 20-30 years and 31-40 years age groups respectively. Majority (56.6%) of them belonged to low socio-economics status (Kuppuswamy scale, 2007).

38.5% of the male participants had the habit of alcohol intake in addition to tobacco. The habit of chewing tobacco was started by participants between 16-20 years of age (24.4% males and 22.2% females). In 30.3% females the duration of tobacco use was between 11-20 years while in 38.9% males it was between 21-30 years. There was a statistically significant relation between alcohol intake, age of starting of the tobacco habit and duration of tobacco use between male and female participants (Table I).

During the inception of the study, all the participants showed heavy nicotine dependence. By the end of one year, there were 10 males & 19 females who became light nicotine dependent (Graph I). All the heavy nicotine dependent participants were in the preparatory stage and the moderate and light nicotine dependant participants were in the action stage of the Transtheorotical model.

Table I: Tobacco behaviours of the participants.

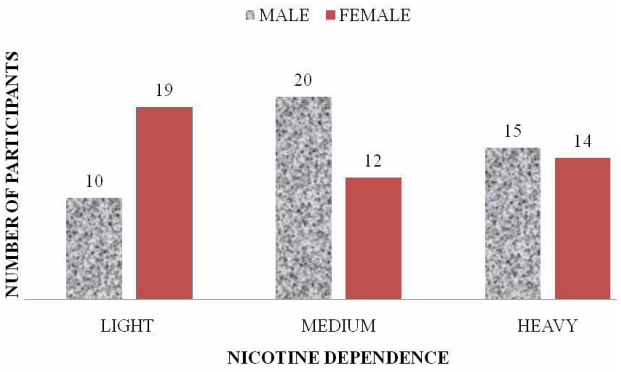
PARTICULAR		NO. OF MALES (%)	NO OF FEMALES (%)	CHI-SQUARE	Df	P value
Alcohol intake	Present	35(38.9)	0(0)	57.273	1	<0.001**
	Absent	10(11.1)	45(50)			
Age of starting tobacco	≤15 Yrs	4(4.4)	0(0)	10.095	3	<0.05*
	16-20 Yrs	22(24.4)	20(22.2)			
	21-25 Yrs	19(21.1)	19(21.1)			
	≥25 Yrs	0(0)	6(6.66)			
Duration of tobacco use	≤10 Yrs	0(0)	13(0)	72.500	3	<0.001**
	11-20 Yrs	0(0)	27(30.3)			
	21-30 Yrs	35(38.9)	5(5.55)			
	>31 Yrs	10(11.1)	0(0)			

(* significant, ** highly significant).

Discussion:

Kipnis & Davidoff (2003) opined that the major deterrent to quitting smoking are the withdrawal symptoms in form of depressed mood, insomnia, irritability, anger, frustration, difficulty in concentrating, restlessness, decreased heart rate and increase in appetite or weight gain. These withdrawal symptoms can occur in an isolated fashion or concurrently.

Graph I: Showing Nicotine dependence by the end of 1 year



Unfortunately, these withdrawal symptoms are not minor in intensity.

Only 7.9 percent were able to cessate themselves of the habit without help (Bates & Bueltel, 1999). Several methods individually or in combination have had good success rate. For instance, the advice of a physician alone can improve the smoking cessation rate to 2 percent (Kipnis & Davidoff, 2003).

In the present study 32% were helped to reduce the nicotine dependence in them using the '5 A' model. This is in contrast to the study by Kim & Seo (2001) where 32.5% were cessated. But there was a difference in the assessment of the habit of cessation. In the study by Kim & Seo (2001) it was done by the expiratory CO level. 'Motivational discussion' could have been the main strategy of the intervention for assisting and arranging follow-up contacts. As both components of the '5A' model are essential to improve quitting rates.

The magnitude of effect of this intervention was not parallel to the study by Puschel et al (2006) where the abstinence was only 15%. The quasi-experimental design of the study could have affected the internal validity of the results. The cohort was significantly different in some important variables such as socioeconomic status and stages of change unlike our study. Chatkin et al (2004) reported 14.5% of abstinence rate which could be due to the doses of the intervention delivered which were insufficient to achieve a higher smoking cessation rate. Our baseline and post-intervention results showed a good level of information and supportive attitudes towards tobacco restrictive policies among women. Our study showed that a systematic approach based on the '5 A' strategy can produce benefits. Even though the effectiveness needs to be evaluated with larger sample size and expiratory CO level. Our initial results tends to show positive influence of the brief interventions for tobacco cessation by the dentist.

The Transtheoretical behavior model which underlies the '5 A' strategy has been criticized by its lack of consistency to predict smoking behavior (West, 2005). Yet if a small population of dentists would be able to get a change in the tobacco behavior of the patients the above criticism could be proved wrong.

Recommendations & Conclusion:

Our study shows a reduction of 32% in the prevalence of tobacco use after the implementation of the programme using the "5 A" method. Tobacco cessation interventions are highly cost-effective, therefore, health professionals should identify smokers, encourage and support them to stop and provide follow-up. To maximize long-term success, use of nicotine replacement therapy (NRT) in conjunction with a behavioral programme should be planned. There is a need to create a smoke-free office environment. It is imperative for employees to serve as nonsmoking role models and provide a cessation-oriented atmosphere. But while there is no dearth on policies being made at both the community level and individual level, the true challenge lies in implementing them. Monitoring of effective planning and execution of programmes by appropriate authorities at regular intervals is vital for successful achievement of the goal of "**Tobacco Free Society**".

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Research Article

Cariogenic Potential of Most Commonly Prescribed Liquid Oral Medicines for Children

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Abstract:

Consumption of liquid oral medicine by frequently ill children, significantly increases the risk of tooth demineralization. In this study a survey was conducted wherein the pediatricians, pharmacist and medical representatives of Bhopal city were enquired about the most commonly prescribed liquid oral medicines for children. The four categories of medicines reported were: antipyretics/analgesics, antibiotics, antihistaminics/antitussives and multivitamins. Three samples from each category were taken. Sugar concentration was evaluated by Lane-Eynon general volumetric method and pH was measured by using digital pH meter (EU-TECH). High concentration of sugar was found in 50% of samples and 90% samples showed low pH. Sugar concentration was in a range of 20.6 to 68.2% and pH in a range of 3.8 to 8.5. As sugar in medication is a potential threat to teeth, therefore, alternatives including sugar substitute should be considered.

Key Words: Cariogenic potential, Liquid medicines, Sucrose, Critical pH

Introduction:

Dental caries is a dynamic disease involving the calcified tissues of the teeth and requires the presence of bacterial plaque, a dietary fermentable carbohydrate like sugar which results in acid production and subsequent demineralization of the tooth surface. The bacteria metabolizes sugar which increases local concentration of organic acid in the inner layer of plaque on the tooth surface, which lowers the pH resulting in a process of demineralization in which calcium and phosphate diffuse out of tooth enamel (Foster & Fitzgerald, 2005).

Medications increases the risk of caries (Feigal et al, 1981). The use of liquid pharmaceutical preparations frequently used for children with conditions such as congenital heart disease, asthma, juvenile idiopathic arthritis (JIA) and other immuno-compromised conditions, and they are called as "high caries risk" children (Foster & Fitzgerald, 2005). To improve palatability and perhaps patient's compliance, many liquid medicines are sweetened with sucrose (Robert, 1979). Sucrose acts as a preservative, an antioxidant, a solvent, a demulcent and a bulking agent. It is widely used because it is cheap, non-hygroscopic and easy to process (Bigeard, 2000). However, it is one of the most cariogenic sweetener (Rubin & Simunovic, 1989).

In vitro studies showed drop in pH of dental plaque produced by different sucrose-sweetened medicines like iron containing syrups and antitussive syrups. On consumption of sugar containing medicines, intraoral plaque pH drops. This drop is significantly more after 15% sucrose containing medicines than after rinsing the mouth with 10% sucrose solution (Feigal et al, 1981). Most studies addressing this core issue have helped policy decision makers and health professionals to control, avoid or replace sugar in medicines to non-cariogenic sugar and showed promising results (Peres et al, 2005).

The present study was carried out with the aim to determine the cariogenic potential of most commonly prescribed liquid oral medicines for children by estimating the percentage of sugar concentration and pH of these medicines.

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Materials and Methods:

The study was divided into two phases. In the first phase various Pediatrician, Pharmacist & Medical Representative of Bhopal city were asked regarding the generic name, trade name, duration of usage and doses of most prescribed liquid oral medicines. According to survey, 12 medicines under four categories were found to be most commonly prescribed medicine and were labelled as: Group A- antipyretics/analgesics (sample no. 1,2,3); Group B- antibiotics (sample no. 4,5,6); Group C- antihistaminics/ antitussives (sample no. 7,8,9) and Group D- multivitamins (sample no. 10,11,12).

In the second phase, determination of sugar level was carried out in these 12 samples of medicines. All procedures were performed at Biochemistry Research Laboratory at People's Centre for Scientific

Research & Development, Bhopal. Preliminary qualitative analysis was carried out for the presence of sugar by Benedict's test. This was followed by the quantitative analysis where type of sugar and its concentration were estimated under the following steps:

(a) Preparation of aqueous extract of sample: First the samples were weighed using digital weighing machine followed by dilution with distilled water. Then samples were treated with clarifying agent to remove active compounds of medicine followed by removal of excess of clarifying agent and then remnant was filtered to get an aqueous extract.

(b) Estimation of reducing sugar: It was done by using Lane –Eynon general volumetric titration based method. In the titration assembly burette was used to add unknown sugar sample which was titrated against Fehling's solution with an indicator. The end point was indicated by change in colour from blue to pink.

(c) Estimation of total reducing sugar in aqueous extract of samples by inversion method: As sucrose is a disaccharide it needs inversion for estimation. Samples were treated with hydrochloric acid, then kept at 70°C in water bath for 30 minutes and then kept at room temperature for 24 hours. It was then neutralized with sodium hydroxide followed by titration with same method.

(d) Calculation:

$$\text{Reducing sugars \%} = \frac{\text{Fehling factor} \times \text{dilution} \times 100}{\text{Weight of sample} \times \text{titer value}}$$

Sucrose% = [total reducing sugar% after inversion - reducing sugar % before inversion] × 0.95

(e) Determination of pH: Digital pH meter (EU-TECH) was calibrated by using buffer solution of pH 7 and 4 (by buffer standard capsule). Sample was diluted to 50% with distilled water and then pH was measured.

All the readings were taken three times and standard deviations (SD) was calculated.

Results:

All 12 most commonly prescribed medicines were analyzed for their sugar concentration (Table I) and pH (Table II). The drug with highest concentration of sugar i.e. 68.26±1.84% was found in sample no. 12 of group D followed by sugar concentration in sample no. 7 of group C (62.89±1.80%), sample no.1 of group A (61.87±1.77%) and sample no. 6 of group B (58.14±1.49%). Lowest pH of 3.82 was found in sample number 9 of Group C. Lowest pH in Group A was 4.22 (sample no. 2), in group B lowest pH was 4.36 (sample was no. 4) and in group D lowest pH was 4.0 (sample 11). High concentration of sugar was found in 50% of samples (55.84±1.57 to 68.26 ±1.84) & 90% samples showed pH below critical value (5.5).

Among 12 most commonly prescribed medicines, three did not have sugar contents (sample no. 4,8,9) and one contained artificial sweetener (sample no. 11). The sugar concentration was found to be in range between 20.62 to 62.89 % while the pH was found in the range of 3.82 to 8.5.

Table I: Showing sugar percentage of commonly prescribed liquid oral medicines (*Syrup, **Suspension).

GROUP OF MEDICINES		BENEDICT'S TEST	REDUCING SUGAR% (± SD)	SUCROSE% (± SD)	TOTAL REDUCING SUGAR % (±SD)
Antipyretic/ Analgesics (Group A)	SAMPLE 1*	++	4.08 ± 0.26	54.9 ± 1.21	61.87 ± 1.77
	SAMPLE 2**	+	2.27 ± 0.23	17.42 ± 0.33	20.62 ± 0.55
	SAMPLE 3**	++	4.1 ± 0.26	53.17 ± 1.15	60.08 ± 1.69
Antibiotics (Group B)	SAMPLE 4**	+	0	0	0
	SAMPLE 5 **	+++	1.34 ± 0.20	23.44 ± 0.57	26.02 ± 0.68
	SAMPLE 6**	+	0	58.14 ± 1.22	58.14 ± 1.49
Antitussives (Group C)	SAMPLE 7 *	++	4.36 ± 0.12	55.60 ± 1.31	62.89 ± 1.80
	SAMPLE 8 *	+	0	0	0
	SAMPLE 9 *	-	0	0	0
Multivitamins (Group D)	SAMPLE 10*	+++	19.5 ± 0.21	34.52 ± 1.06	55.84 ± 1.57
	SAMPLE 11*	-	0	0	0
	SAMPLE 12*	+++	6.95 ± 0.26	58.24 ± 1.23	68.26 ± 1.84

Table II: Showing pH of commonly prescribed liquid oral medicines.

GROUP OF MEDICINES		pH VALUE
ANTIPYRETIC/ ANALGESIC (GROUP A)	SAMPLES NO. 1	5.41
	SAMPLES NO. 2	4.22
	SAMPLES NO. 3	5.44
ANTIBIOTIC (GROUP B)	SAMPLES NO. 4	4.36
	SAMPLES NO. 5	4.91
	SAMPLES NO. 6	8.5
ANTITUSSIVE (GROUP C)	SAMPLES NO. 7	5.44
	SAMPLES NO. 8	5.08
	SAMPLES NO. 9	3.82
MUTLIVITAMIN (GROUP D)	SAMPLES NO. 10	4.22
	SAMPLES NO. 11	4
	SAMPLES NO. 12	4.62

Discussion:

The loss of tooth minerals during caries progression is caused by the formation of acids by bacteria, which lowers the pH to the point where the hydroxyapatite mineral of enamel dissolves (Nikiforuk, 1985), a process called demineralization. With increase in pH, the inverse process occur called re-mineralization, in which there is a reprecipitation of minerals in the damaged area. Thus, the carious process is a dynamic process which over a period of time may result in a net loss of mineral and subsequently lead to cavitation (Pierro et al, 2004). Time factor in caries development is associated with frequency of sugar exposure. Classical example is Vipeholm dental caries study (Newburn, 1989). In children who have to use medicines several times per day for long periods of time, sucrose-based medicines with acidic pH have potential for increasing dental caries (Girish et al, 2008). Caries as expressed by dmft index (decayed missing, filled teeth) increases significantly with increasing number of times the intake of snacks and drinks per day (Holt, 1991)

In our study 50% of the most commonly prescribed liquid oral medicine showed high sugar percentage and 90% of the medicines showed pH below the critical value of 5.5. The concept of critical pH was initially applied to indicate the pH at which saliva was no longer saturated with respect to calcium and phosphate ions, thereby permitting hydroxyapatite to dissolve. The critical pH may, therefore, be the pH at which the environment of the enamel becomes unsaturated and at which sufficiently high concentrations of un-ionized acid is present to ensure the inward diffusion of enough acid to extend the lesion (Nikiforuk, 1985).

In our study medicine contained sugars in a range of 20.62 to 68.26%. The results are at par to the studies conducted by Rubin (1989) and Peres et al (2005) who reported sugar content in medicines to be 20.0 to 74.5% & 8.6 to 67.0 % respectively. In the present study pH of liquid oral medicine was in the range of 3.82 to 8.5 range which was found similar to the range of 2.6 to 6.2 in commonly prescribed medicines for children. (Nunn et al, 2001).

Bigeard in 2000 suggested following guidelines to reduce liquid medicine related dental caries:

1. Inform parents and children about cariogenic potential of medicines and also the importance of tooth brushing after taking these medicines.
2. General practitioners, pediatricians and dentists should preferably prescribe non-cariogenic forms of medicines e.g. tablets or capsules. It they prescribe sugar containing medicine then they should give advice for proper oral hygiene.
3. All medicine should be labelled with the type of sweetener, whether sugar containing or sugar free. If it is a sugar containing medicine, it should be labelled with a warning for tooth decay.
4. Pharmaceutical companies should be urged to either reduce the sugar content in medicine or replace it with alternative sweetener agent.

Reducing the cariogenic potential of medication for children should be of concern to all health professionals. A public health policy must be implemented in order to limit sugar in medicines. (Peres et al, 2005)

Conclusion:

Frequent & long term consumption of liquid oral medicines was seen in chronically ill children. On basis of a survey, 12 most commonly prescribed liquid oral medicines were analyzed for their sugar concentration & pH. High concentration of sugars was found in 50% of samples & 90% samples showed pH below critical value. These drugs form high cariogenic formulations. Hence, their cautious use and education to parents and children is essential.

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Research Article

Evaluation of Anterior Cruciate Ligament repair with Iliotibial Band

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Abstract:

Reconstruction of the anterior cruciate ligament (ACL) is the surgical treatment of choice as direct primary repair of the ligament has been shown to result in persistent laxity and instability of the knee. The aim of reconstruction is to restore stability of the knee without restricting its functions. Anterior cruciate ligament reconstruction requires a graft which may be either an autograft or an allograft or a synthetic graft.

Most studies agree that using the patient's own tissue (autograft) to repair an anterior cruciate ligament tear is the way to go. Graft taken from patellar tendon gives good results but muscle weakness, pain, tendonitis and kneecap fracture are just a few of the possible post-operative problems.

In this prospective study of ACL reconstruction, tendon material from iliotibial tract was used in a special way for adding stability to the knee called *iliotibial band tenodesis.* Herein, 17 cases of ACL repair and augmantation with iliotibial tract is being evaluated.

Key Words: Anterior cruciate ligament, iliotibial band, tenodesis.

Introduction:

Reconstructions of the anterior cruciate ligament (ACL) are among the most frequently performed procedures in knee surgery nowadays. In the past ACL was a structure that was never touched by a scalpel. However, since the early 20th century, there has been increasing awareness of, and interest in, the ligament and its lesions and repair.

As far back as 1845, Bonnet wrote a treatise on joint disorders causing haemorragic effusion, in which he analyzed knee injuries. He described three essential signs indicative of acute ACL rupture: a snapping noise, haemarthrosis and loss of function "in patients who have not suffered a fracture".

In 1895, Mayo performed the first cruciate (as it was then called crucial) ligament repair in a 41-year-old miner who was injured 36 months back. The case was not repoted in the literature until 1903. In 1917, Groves performed the first ACL reconstruction using an iliotibial band transplant.

In 1935, Campbell for the first time used a tibia-based graft of the medial one-third of the patellar tendon, the prepatellar retinaculum, and a portion of the quadriceps tendon. In 1939, Macey described the first technique using the semitendinosus tendon.

In 1979, Marshall et al harvested the central one-third of the entire extensor group of muscles with a wider portion taken from the prepatellar aponeurotic tissue which was tubed to give greater strength to what would otherwise have been a relatively thin area of the graft. The graft was routed "over the top" of the lateral femoral condyle, and attached with sutures or a staple. The final portion was taken back to be attached to Gerdy's tubercle. In 1975, Rubin et al developed an experimental model of a prosthetic ACL made up of Dacron. In 1981, Dandy was the first to implant a carbon fibre-reinforced ligament substitute, using an arthroscopic procedure. The results were poor.

As carbon fibre went out, Dacron and Gore-Tex came in, and the "arthroscopy generation" of surgeons seized on these synthetic materials as a means of performing ACL reconstructions quickly with minimal trauma. At the same time, metal interference screws were introduced into orthopaedic surgery.

In 1982, Lipscomb et al started using pes anserinus (semitendinosus & gracilis) tendons pedicled on the tibia for ACL reconstruction. In 1988, Friedman pioneered the use of an arthroscopically assisted four-stranded hamstring autograft technique. Pinczewski et al (1997) used an "all-inside" technique with special large (8 mm) round-headed interference screw known as the RCI screw. Other leading surgeons started using hamstring tendons with different means of fixation. Rosenberg (1993) devised fixation with the so-called "Endo-Button" that locked itself against the lateral aspect of the femoral condyle. Paulos et al (1991) used a polyethylene anchor; Staehelin & Weiler (1997) tried biodegradable interference screws.

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Material & Methods:

From January 1995 to July 2010, 23 patients of classical acute midsubstance tear of anterior cruciate ligament were diagnosed by clinical, radiological (skiagrams & MRI-Fig.I) and arthroscopic evaluation. Out of these 23 cases, 6 cases were lost to followup post-operatively within the first year. The maximum follow up in these lost six cases was for a period of 8-10 months, hence they were excluded from the study.

Out of the seventeen cases included in this study, 12 were males and 5 were females. The age ranged from 24 yrs to 46 yrs. with an average age of 32 yrs. The mode of injury in these patients varied: nine patients sustained knee injury due to road traffic accidents mostly with motorcycles; four patients gave a history of fall while walking or running with a significant twist of the injured knee and two patients sustained injury while playing football, on the field . A lady missed a step on the stairs and fell and another patient skidded off a motorbike. Three patients distinctly heard an audible pop at the time of injury.

The history and clinical examination suggested that most of the patients had a feeling of the knee giving way, instability and an apprehension of a fall while running and walking on uneven ground. Swelling of the affected knee and synovitis was present in all the cases. Thirteen patients had a full range of extension while only seven could flex the knee completely. Six patients had a positive anterior drawer test and four demonstrated a positive Lachmann test.

Inclusion criteria: Midsubstance tear of ACL with or without associated: lateral or medial meniscus injuries, lateral ligament injuries and absence of lateral instability.

Exclusion criteria: Comprised of proximal and terminal avulsions of ACL from the femur and tibia and lateral instability.

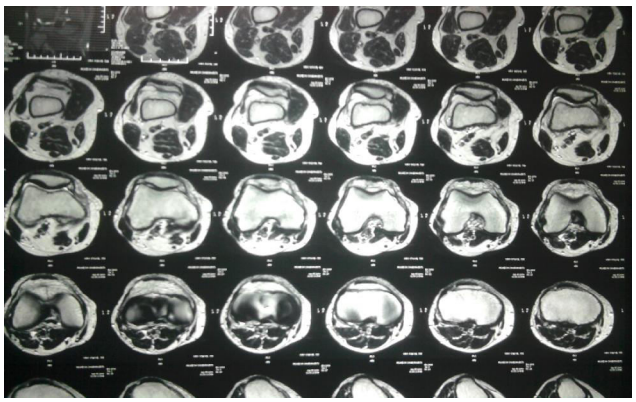

Fig. I: Showing MRI of ACL tear

Fig. II: Showing anterior tibial translation.

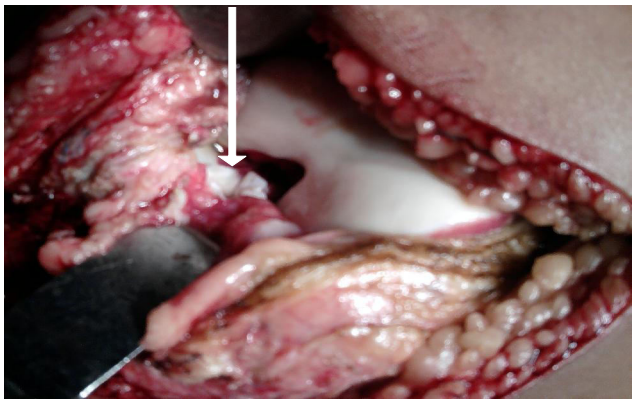

Fig. III: The arrow showing torn ACL.

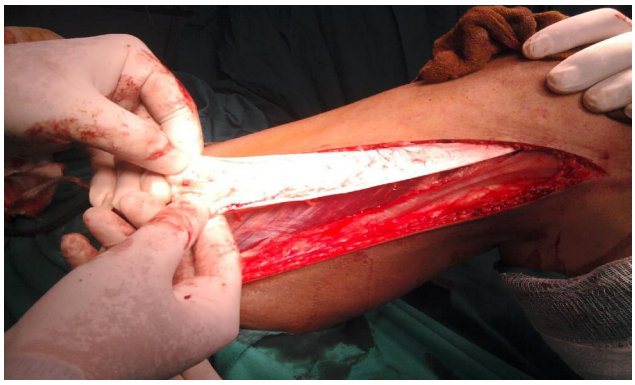

Fig. IV: The strip of iliotibial band.

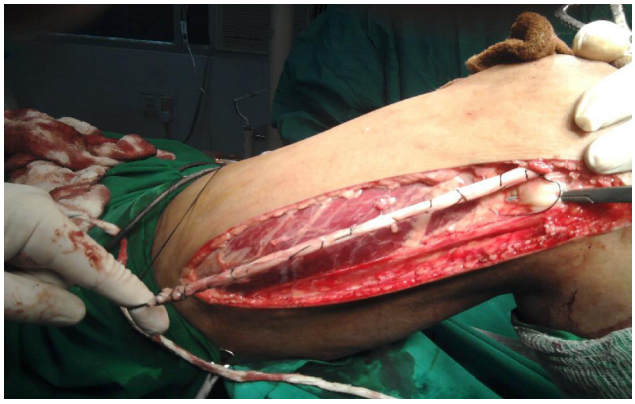

Fig. V: Showing the illotitial tract strip rolled into a tube.

Fig. VI: Showing the strip passed underneath the fibular collateral ligament.

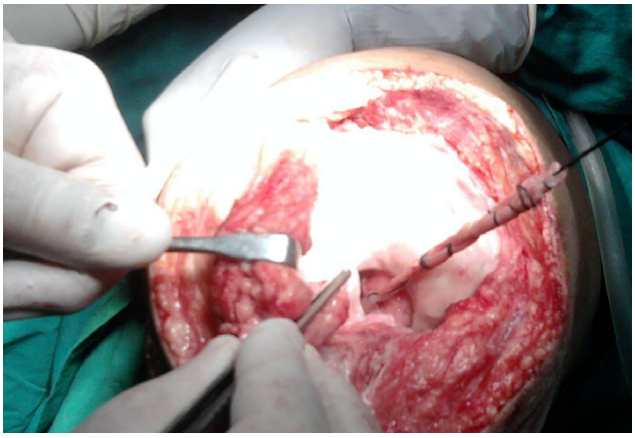

Fig. VII: The strip brought into the joint from 'over the top' of the lateral femoral condyle and through the upper most posterior part of capsule.

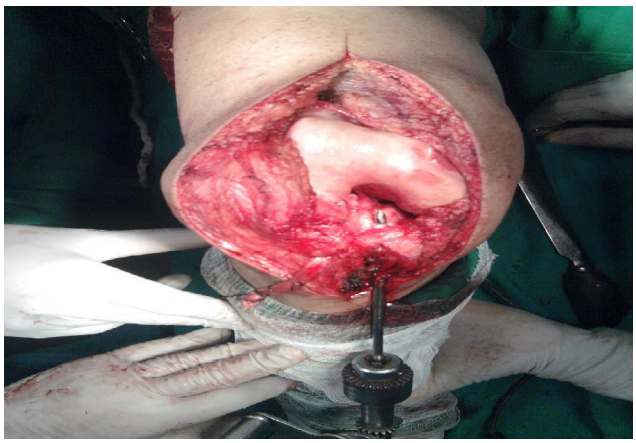

Fig. VIII: The hole being drilled into the medial aspect of tibia for the iliotibial band.

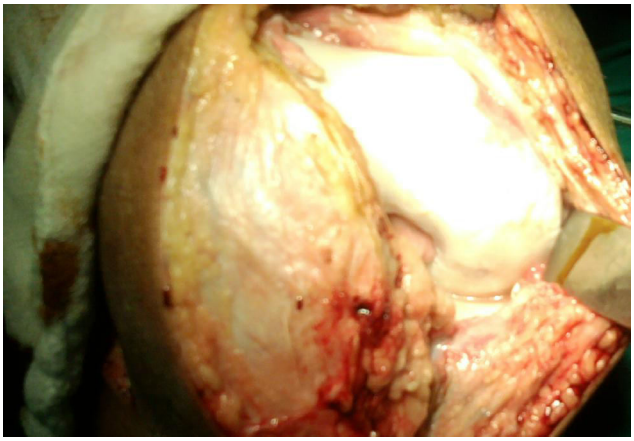

Fig. IX: The arrow showing reconstructed ACL in position.

Skiagrams were taken routinely to exclude associated fractures. Seven patients had an exclusive tear of the anterior cruciate ligament. In rest of the cases concomitant injuries like lateral menicus, medial meniscus and medial collateral ligament were encountered. The average time period between the injury and surgery was six weeks.

The operative technique adopted in this series was as described by Marshall et al (1979) with minor modifications to cater to the needs of the patient.

A paramedian incision of the knee was used in the earlier cases but later as a modification a midline incision was preferred with the knee flexed to ninety degrees. This relaxes the tension on the incision when the knee is extended from this position. After correcting all intra-articular pathologies, sutures were placed in the anterior cruciate ligament stumps and carefully secured for later use.

A strip measuring approximately 3.5 to 4 cms. wide and 15 to 20 cms. long of the Iliotibial band (iliotibial tract) was freed from the anterior two third of the iliotibial band and was left attached to its distal attachment to the tibia specially Gerdy's tubercle (Fig.IV). The posterior third portion of the iliotibial band running from the tibia to the femoral epicondyle was preserved as it acts as an effective static tibiofemoral ligament and its detachment may result in a potentially severe varus and internal rotation instabilities. The remaining band was approximated longitudinally.

The strip was rolled into a tube with unabsorbable running sutures with knots at intervals (Fig.V) and was passed beneath the fibular collateral ligament as close to its femoral attachment as possible to prevent its becoming slack later on (Fig.VI), and sutured to the osteoperiosteum with the knee flexed to ninety degrees and the foot in external rotation.

The "over the top" point was selected at the flare of the femoral condyle & a slot was roughened out for the placement of the strip. A hole was then prepared in the uppermost part of the posterior capsule of the knee joint for the passage of the strip into it (Fig.VII - this position prevents slipping of the strip

Fig. X: Showing the centrally placed (modified) anteriar and the conventional lateral incisions.

from the femoral condyle). It was then pulled into the anterior part of the knee joint tightly over the top in the slot prepared, deep to the lateral intermuscular septum attached on the femoral condyle and placed medial to the repaired ligament. Then it was passed through a tunnel created in the tibia from the anterior intercondylar eminence to a point 4 cms below the joint line on the medial aspect of the tibia medial to the tibial tuberosity (Fig.VIII). The terminal end of the strip was sutured with nonabsorbable sutures to the soft tissues and to an osteoperiosteal flap. The sutures of the stumps of the torn ACL were now tied and the iliotibial band strip was attached to the repaired ligament . A vascular fat pad graft was attached to the repaired ligament with two or three absorbable sutures.

This technique combines the advantages of both the intra and extra-articular features. The part running from the Gerdy's tubercle beneath the fibular collateral ligament and "over the top", if properly placed, not only is isometric with the intra-articular anterior cruciate ligament but is an effective internal rotation checkrein. The extra-articular component helps protect the intra-articular repair and augmentation during the revascularization and recollagenization.

After treatment included an emphasis on accelerated rehabilitation with active movements of the knee from the second post-operative day onwards. No form of immobilization (plaster, brace etc.) was instituted. The goals of the first two weeks were:to eliminate swelling due to activity; progress from partial weight bearing to full weight bearing exercises; regain normal range of motion and to increase the strength of quadriceps and hamstring.

Initial physical therapy consisted of range of motion (ROM) exercises: continuous passive motion (CPM) devices and isometric exercises. Knee extension within two weeks is important. Approximately six weeks is required for the graft to attach to the bone. However, the patient can walk on their own and perform simple physical tasks prior to this with caution, relying on the surgical fixation of the graft until true healing (graft attachment to bone) has taken place. After twelve weeks of surgery, the patient can begin a more aggressive regimen of exercises involving stress on the knee with increasing resistance.

Result:

Results were measured by asking following questions to the patient:

- Ability to return to a preinjury level of activity and range of movements.
- Pain or instability during walking, standing or running
- Satisfaction with the operation
- Willingness to have the same operation again

The longest follow up recorded in the present series is of fifteen years with an average of 7.79 years.

Almost all the seventeen patients could return to the preinjury level of activity, feeling confident during walking and standing without an anterior translation of tibia during weight bearing. A hopping test was carried out at the end of 12 weeks; none of the patient had any problem going through it.

All patients were painless after a sincere stretch of a rehabilitation program carried out for a minimum period of six months starting from the second post-operative day. Nobody complained of anterior knee pain or a fracture of the patella. Two patients complained of scar hypertrophy (keloid) and one complained of pain at the site of tenodesis for the first 6-8 months which gradually subsided. One patient also had a minor harmless herniation of the quadriceps muscle on the lateral aspect of the thigh.

There was no complaint of the knee giving way or anterior translation of the tibia while walking. In two patients the operated knee was slightly lax as compared to the normal one but was asymptomatic. Anterior drawer test and Pivot shift test were negative in all the cases. The final outcome was evaluated on the basis of Tegner's activity scale:

Levels	Interpretation
1. Levels 7-10	Competition Sports
2. Levels 4-6	Physical fitness activities and moderate to strenuous work activities
3. Levels 1-3	Light work and activities of daily living
4. Level 0	Permanent Disability

One patient attained the highest level, returning back to his profession of a physical instructor and a football coach. Fourteen patients attained the second level while two patients reached the third level.

Discussion:

Looking at the history of ACL surgery, it is amazing to see how long it took for some diagnostic and management techniques to establish themselves. Long ago, the ACL was a structure that was never operated upon. However, since the early 20th century there has been increasing awareness and interest in the ligament and its lesions.

In 1981 Dandy was the first to implant a carbon fibre-reinforced ligament substitute using an arthroscopic procedure. The results were poor. Unfortunately, carbon deposits were found in the synovial membrane and the liver, which put a stop to the further use of this technique.

Carbon fibre were replaced by synthetic materials like Dacron and Gore-Tex by surgeons for arthoscopic ACL reconstruction with minimal trauma. However, towards the end of the 80s, there was an unacceptably high rate of synovitis and subsequent rupture of the neoligaments.

No ideal graft site for ACL reconstruction exists, they all have advantages and disadvantages. Jone's procedure (1963) involving the free bone-tendon-bone graft of the central one-third of the patellar tendon was once considered to be a "gold standard" for knee stability by surgeons. However, it suffered a slightly higher complication rate. The disadvantages included: increased wound pain, increased scar formation as compared to a hamstring tendon operation, risk of fracturing the patella during harvesting of the graft, increased risk of tendinitis and increased level of pain with activities that require kneeling. This was the time when metal interference screws were introduced in orthopaedic surgery.

In 1987, Kurosaka et al showed that the mechanically weak link of the reconstructed graft was its fixation. The research had clearly showed that 9-mm diameter cancellous screws were much superior to other fixation systems. Within a few years such screws came to be made of resorbable materials such as Polylactic acid (1992) or Polyglycolic acid (1990).

In 1982, Lipscomb et al started using pes anserinus (semitendinosus and gracilis) tendons pedicled on the tibia, for ACL reconstruction.

Unlike the patellar tendon, the hamstring tendon's fixation to the bone can be affected by motion in the post-operative phase. Therefore, following surgery, a brace is often used to immobilize the knee for one to two weeks during which the most critical healing takes place. Evidence suggests that the hamstring tendon graft does just as well, or nearly as well, as the patellar tendon graft in the long-run .

The procedure of Marshall et al (1979) adopted for the present study provides the combined benefits of the intra-articular as well as the extra-articular fixation. Extra-articular reconstruction uses the structures on the lateral side of the knee to mimic the actions of ACL. By surgically tightening the iliotibial tract, excessive lateral excursion of the tibia is prevented. Intra-articularly it involves a tibially based graft, which means that the strongest part of the graft occupies the tibial tunnel. The overall aim is to prevent anterior subluxation of the lateral tibial plateau in relation to the lateral femoral condyle and to correct anterolateral rotatory instability. Load sharing between the intra and extra articular elements may also occur. A graft from the iliotibial tract has satisfactory mechanical properties and results in less anterior knee pain. However, there is a long lateral operative scar, with a minimal risk of herniation of the quadriceps muscle laterally.

The future holds every prospect of further progress being made. As suggested by Imbert (1994), it is likely that ligament replacements will take the form of "bioimplants" produced with the aid of cell and tissue culture techniques. Perhaps, fresh lesions will be made to heal with gene therapy.The last word has not yet been said in the fascinating story of ACL surgery.

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Research Article

Comparative Evaluation of two Polishing Systems on the Surface Texture of an aesthetic material (nano-composite): A Profilometric Study

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Abstract:

Composites have revolutionized the concept in asthetic dentistry. Proper finishing and polishing of composites are important aspects of clinical restorative procedures that enhance both asthetics and the longevity of the restoration. A number of finishing and polishing devices are available, but to decide the efficacy of various materials is still a challenge to the dentists or clinicians. Hence the study was undertaken to determine the effectiveness of two polishing systems Sof-Lex and PoGo on Filtek Z350 by evaluating surface roughness using a Profilometer. The study concluded that Sof-Lex is a better polishing system than PoGo.

Key Words: Roughness average, Sof-lex, PoGo, Filtek Z350, Polishing.

Introduction:

Composites have revolutionized the concept in asthetic dentistry. The clinical use of composite has increased substantially over the past few years due to increased aesthetic demands by patients, improvement in formulation and simplification of bonding procedures (Gupta et al, 2002). Composite is a heterogeneous material that is composed of three major components i.e. resin matrix, filler particles and silane coupling agent (Senawongse & Pongprueksa, 2007).

Polishing is the process carried out after the finishing procedure to remove minute scratches from the surface of a restoration and obtain a smooth, light-reflective luster (Jefferies, 2007). The ultimate asthetics of these tooth coloured restoratives is strongly influenced by the final surface polish (Jefferies, 1998). Smooth highly polished restorations have been shown to be more easily maintained than restoration with rougher surfaces. Polishing also reduces plaque retention and minimizes possible gingival irritation. It also prevents staining and recurrent decay (Turkun & Turkun, 2004).

A variety of instruments are commonly used for finishing and polishing tooth-coloured restorative materials including: carbide finishing burs, 25-50 µm diamond finishing burs, abrasive impregnated rubber cups and points, aluminum oxide coated abrasive discs, abrasive strips, and polishing pastes (Uçtasli et al, 2004). A number of finishing and polishing devices are available, but to decide the efficacy of various materials is still a challenge to the dentists or clinicians. Hence the study was undertaken to determine the effectiveness of two polishing systems on an aesthetic material by evaluating surface roughness using a Profilometer.

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Materials and Method:

The study was carried out in the Department of Conservative Dentistry and Endodontics, Krishnadevraya College of Dental Sciences and Hospital in collaboration with Department Of Mechanical Engineering, Indian Institute Of Sciences, Bangalore.

A total of 20 specimens were prepared of light activated nanofill resin composite Filtek Z350 (3M ESPE, Dental products, St. Paul, USA), approximately 3mm in diameter and 2mm in height. Filtek Z350 is composed of nanomer and nanocluster. The advantages are higher filler loading, high degree of crosslinking and compact molecule which creates a very hard resin matrix with a high degree of polishiability. The specimens were prepared in a stainless steel mold (Fig. I). The composite was filled with a composite filling instrument. The mold was slightly overfilled with composite resin and a mylar strip

Fig.I: Stainless steel cylindrical mold

was placed on both sides of the mold. The composite resin was sandwiched between two glass plates to extrude the excess material. The excess material was then removed. The composite resin was cured with a light curing unit for 40 seconds on both sides of the mould through the glass plates to standardize curing distance (1.35mm). Light intensity of the curing unit was standardized to 400mW/cm^2 using a light intensity meter (radiometer). The intensity of light was checked before every use with a radiometer. The resin blocks were finished to a uniform surface using carbide bur at a speed of 10,000 rpm for 10 seconds on each of the surfaces to create baseline finishing. In this way all the blocks were prepared to a standard surface. Now all the blocks were equally divided into the two groups for final polishing. One group of 10 blocks was polished with Sof-Lex (3M ESPE, Dental products, St. Paul, USA-Fig. II) and another group of 10 blocks was

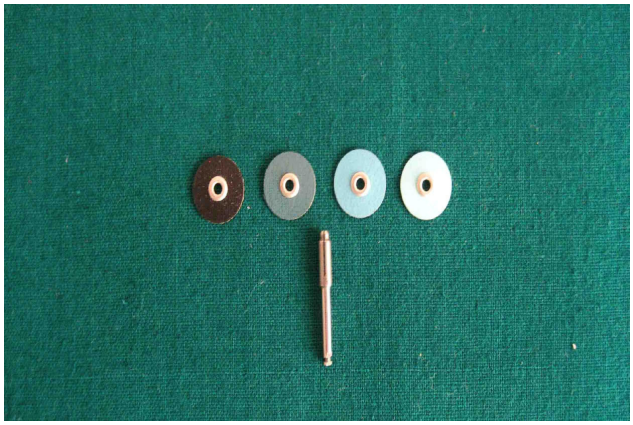

Fig.II: Showing Aluminium oxide abrasive disk (Sof-Lex) & metal mandral.

Fig.III: Showing premounted diamond impregnated cured urethane dimethacrylate resin PoGo polisher.

polished with PoGo (Dentsply caulk, Milford, USA-Fig.III). The Sof-Lex is a multi-step abrasive disks containing aluminium oxide abrasive used for polishing composites. PoGo polishers are premounted single use diamond impregnated cured urethane dimethacrylate resin polishing device designed for use in final polishing of all composite restorations.

Polishing Procedure:

10 samples were polished with Aluminium Oxide Abrasive (Sof-Lex). Disks in the kit were attached by a metal hub to the autoclavable metal mandrel. The coarse grit disk was used for gross reduction at medium speed of 10,000 rpm. The medium grit disk was used for gross contouring at medium speed of 10,000 rpm for 15 to 20 seconds. The fine grit disc followed by superfine grit disc was used to finish at high speed of 30,000 rpm for 15 to 20 seconds each. Rest of the 10 samples were polished with Diamond abrasive (PoGo) which was a one step polishing system. The polishing was done at a speed of 20,000 rpm. After the specimens were polished, the specimens were analyzed for surface roughness using a two dimensional surface profilometer (Fig.IV). The Roughness average (Ra) of a specimen was defined as the arithmetic average height of roughness component irregularities from the mean line measured within the sampling length. Profilometer readings were made at the centre of each specimen, and the numerical average was determined for each group. It provided a quantitative recording of surface irregularities. The profilometer is a device that

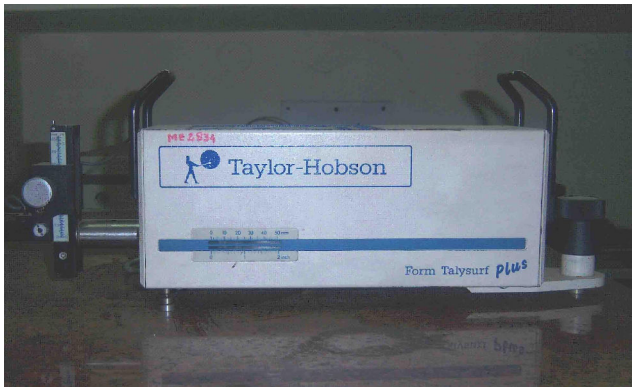

Fig. IV: Profilometer used for measurment of surface roughness (Ra).

uses a diamond stylus of 2µ diameter to trace a fixed linear distance over the surface of the prepared sample. The profilometer produces a tracing using digital and analogue hardware and software, and calculates the average surface roughness (Ra) value for the resultant tracing.

Result:

The results were tabulated (Table-I) and the ANOVA TEST was applied to determine the significant differences in microleakage between the groups (Table-II). P- value of 0.05 or less was considered as statistical significance.

The Profilometer provides a digital readout of average surface roughness(Ra) in microns. The average roughness value represents the arithmetic mean of the height of all surface irregularities over a predetermined linear segment of each specimen.

Table I : Showing roughness average (Ra) of Sof-Lex and PoGo on Z350.

Sample no.	Roughness average of (Sof-lex) in μ	Roughness average of (PoGo) in μ
1	0.134	0.146
2	0.117	0.148
3	0.127	0.139
4	0.118	0.152
5	0.107	0.131
6	0.114	0.143
7	0.127	0.136
8	0.109	0.128
9	0.120	0.144
10	0.104	0.137
Mean	0.1177	0.1404

Sof-Lex showed maximum roughness average of 0.134 and minimum of 0.104μ while PoGo showed maximum of 0.152 and minimum of 0.128μ.

Table II: Comparison in-between Sof-Lex and PoGo

Polishing material	Paired Differences			t	P-value
	Mean	Std. Deviation	Std. Error		
Sof-Lex PoGo	-0.02270	0.00929	0.00294	-7.730	<0.000

Results of one-way ANOVA test for surface roughness showed P< 0.000 which is statistically highly significant.

Discussion:

The continuous development of aesthetically acceptable adhesive restorative material has made a variety of tooth coloured materials available for clinical use. Since the introduction of composite resins, numerous studies have been initiated to develop a finishing and polishing procedure that would produce a smooth surface restoration (Dennison et al, 1981). Composites are finished and polished in order to establish a functional occlusal relationship and a contour physiologically in harmony with supporting tissues. In addition, proper contour and high gloss give the restoration the appearance of natural tooth structure (Turkun & Turkun, 2004).

The final polish obtained on a composite restoration would be determined by two factors; composition of composite with relation to matrix and filler particles and the type of polishing system used. The degree of the polymerization of the matrix, the size, composition and volume of filler particles affect the surface finish obtained on composites as the resin matrix and filler particles do not abrade to the same degree (Yap et al 2004).

This study showed that the specimen Z350 polished with diamond (PoGo) abrasive system gave high roughness average (Ra) as compared to aluminium oxide (Sof-Lex). Sof-Lex gave statistically significant smoother surface than PoGo.

Uçtasli et al (2007) studied the effect of different finishing systems on the surface roughness of different types of composite restorative materials. They found that Sof-Lex discs produced a smoother surface than Po-Go discs for all tested materials which is congruent with the findings of the present study.

Though Diamonds (PoGo) abrasives gave a good surface finish, they were found to be rougher than the surface finish produced by Aluminum Oxide (Sof-Lex) discs. This could be attributed to the fact that diamond (PoGo) discs are less flexible as compared to the extremely flexible aluminum oxide (Sof-Lex) discs. Another reason for the aluminum oxide (Sof-Lex) discs giving better surface smoothness in the study over Diamond (PoGo) could be due to the non displacement of the composite fillers particles by Sof-Lex (Herrgott et al, 1989). The aluminum oxide discs (Sof-Lex) performed better because the fillers in composite are so small that their stiffness is reduced and so their malleability promotes a homogeneous abrasion of the fillers and the resin matrix (Yap et al, 1997). Study by Mitra et al (2003) also supported the concept of homogeneous abrasion.

Conclusion:

The statistical analysis shows that Z350 showed least roughness average with Sof-Lex when compared to PoGo. Hence it is recommended that Sof-Lex should be used as preferable polishing material as it gives better results.

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Case Report

Bilateral Taurodontism in Deciduous Molars: A case Report

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Abstract:

Taurodontism is a rare dental anomaly in which the involved tooth has an enlarged and elongated body and pulp chamber with apical displacement of the pulpal floor. It has a very low incidence and very few cases are reported in literature in deciduous dentition. Endodontic treatment of a taurodont tooth is challenging and requires special handling because of the proximity and apical displacement of the roots. In this article a case of five year child with bilateral involvement of mandibular second molars is presented.

Key Words: Taurodont, enlarged pulp chamber, pulpectomy.

Introduction:

Taurodontism is a developmental disturbance of a tooth that lacks constriction at the level of the cementoenamel junction (CEJ). It is characterized by vertically elongated pulp chamber, apical displacement of the pulpal floor and bifurcation or trifurcations of the roots (Jafarzadeh et al, 2008).

The term "taurodontism" ('bull tooth') was coined from the Latin word "tauros", which means 'bull' and the Greek word "odus", which means 'tooth'. Sir Arthur Keith in 1913 coined the term "taurodontism" and defined taurodontism as "a tendency for the body of the tooth to enlarge at the expense of the roots". Although Gorjanovic-Kramberger in 1908 had first described this type of tooth. Shaw (1928) in his first quantitative study on taurodontism classified the condition as "hypotaurodontism," "mesotaurodontism," and "hypertaurodontism" to define the degree more accurately to which this condition is manifested (Fig. I). Shifman & Channel (1978) suggested a most widely accepted and used criteria, on the basis of the distance from the lowest point of the roof of the pulp chamber (a) to the highest point of pulp floor (b), when divided by the distance from (a) to root apex (c) should be equal to or greater than 0.2 mm and/or distance from (b) to cementoenamel junction (d) should be greater than 2.5 mm (Fig. II).

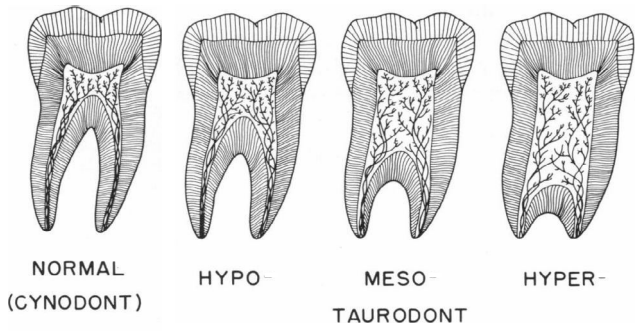

Fig. I: Diagrammatic representation of normal (cynodontic) tooth and three subtypes of taurodontic teeth as proposed by Shaw (1928).

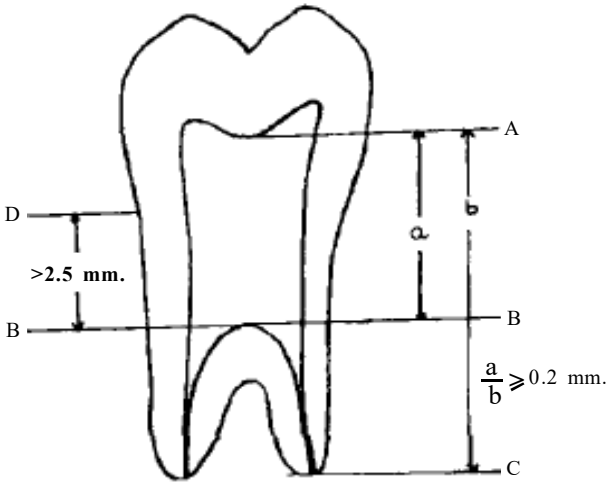

Fig. II: Showing measurements for Taurodontic teeth.

Mandibular molars are more commonly affected teeth. The incidence is reported to be lower than 1% in modern man (Joseph, 2008), 3% in primitives, Eskimos and American Indians (Tsesis, 2003). Taurodontism has been associated with various syndromes such as Down's syndrome, Klinefelters syndrome, Aperts syndrome, Oral-fault digital (Mohrs syndrome), Trichodento-Osseous syndrome etc (Terezhalmy et al, 2001).

There are various theories concerning the etiology of taurodontism: a) a specialized or retrograde character; b) a primitive pattern; c) a Mendelian recessive; d) an atavistic feature and e) a mutation (Mangion, 1962; Hammer et al, 1964). Many explanations

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Fig. II: Arrow showing enlarged pulp chamber in mesotaurodont right mandibular primary molar.

for the pathogenesis of taurodont formation have been put forward from time to time, They include: a) an unusual developmental pattern; b) a delay in calcification of the pulp chamber floor; c) an odontoblastic deficiency; d) an alteration in Hertwig's epithelial root sheath, with an apparent failure of the epithelial diaphragm to invaginate at the normal horizontal levels; and e) a delayed or incomplete union of the horizontal flaps of the epithelial diaphragm (Shafer, 1999).

Diagnosis is usually made by routine radiographs. The most important aspect of this rare dental anomaly is due to difficulties encountered in performing endodontic treatment (Yeh & Hsu, 1999).

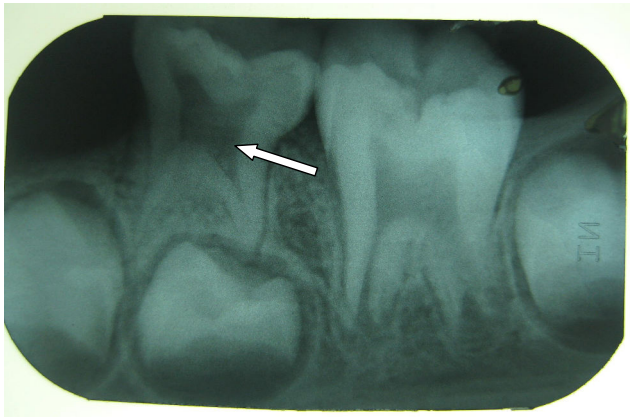

Fig. IV: Arrow showing mesotaurodont right mandibular primary molar.

Case Report:

A five year old male child was brought to People's Dental Academy, Bhopal with complain of pain related to left posterior tooth region of mandible for last two weeks. There was no significant dental or medical complaint in the past. His developmental

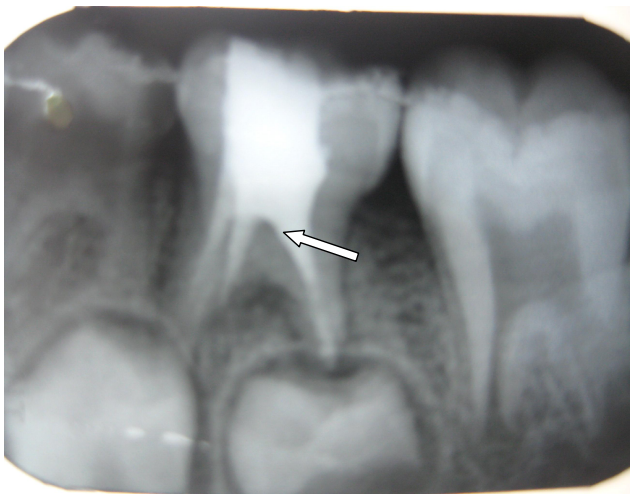

Fig. V: Intra oral perapical radiograph after obturation.

milestones were within normal range. His intraoral examination revealed normal soft tissue appearance with a large carious lesion in mandibular left deciduous second molar. Intraoral periapical radiograph of both sides revealed large pulp chambers and short roots (Fig. III & IV). There was no involvement of periapical tissues. Based on clinical and radiographic findings, a diagnosis of chronic pulpitis was made in relation to mandibular left second primary molar. The tooth was anaesthetized, the access was opened under rubber dam isolation and the access cavity was modified. The remaining pulp tissue was extirpated.

The pulp was voluminous, to ensure complete removal, 2.5% sodium hypochlorite was initially used as an irrigant to soften the pulp. Once the pulp was extirpated, further irrigation was done with normal saline. The pulp chamber was huge and the floor of the chamber could not be visualized. At the furcation area, four canal orifices were found: mesiobuccal, mesiolingual, distobuccal and distolingual. A working length radiograph was taken with #15 file in all the canals and biomechanical preparation was done followed by obturation with endoflas. After the root canal obturation to predetermined length, pulp chamber had to be filled with large amount of endoflas obturating material (Fig. V). This procedure of pulpectomy was followed by restoration of the tooth with stainless steel crown.

Discussion:

Taurodontism is a rare morphological variation which causes the occluso-apical elongation of the pulp chamber, and the reduction of the root size. Taurodontism is frequently associated with other

anomalies and syndromes (Mangion, 1962). In this case, the patient was healthy and without any known diseases or a syndrome.

Endodontic treatment in taurodontism teeth has been described as a complex and difficult procedure. Pulp therapy for taurodonts is a challenging treatment, with increased incidence of haemorrhage during access opening which may be mistaken for perforation. Since the roots are short and pulpal floor is placed apically, care should be taken to prevent perforation. Conventional obturating materials like Zinc oxide eugenol in bulk may take longer time to resorb which may delay the natural exfoliation of the tooth. In such cases combination of calcium hydroxide can act as a wonderful material due to its resorption rate. So in the present case endoflas as an obturating material was used, which is a combination of zinc oxide eugenol, iodoform, calcium hydroxide and barium sulphate. This material has added advantage of faster rate of resorption due to presence of calcium hydroxide and iodoform.

In addition to the difficulty in endodontic procedure, the present case suggest the possibility that taurodont tooth may have an abnormal root canal system, which is another challenging tasks for pedodontist.

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Case Report

Oral Myiasis caused by Chrysomya bezziana: A case report

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Abstract:

Myiasis is caused by members of the Diptera fly family that lay eggs on food, necrotic tissue, open wounds, and unbroken skin or mucosa. Although myiasis is primarily a problem of cattle and livestock in tropics, human infestation is uncommon and occurs accidentally in persons at extremes of age, who are debilitated or not able to ensure basic hygiene and wound cleanliness. The oral cavity is an uncommon site of infestation as was seen in the case reported here.

Key Words: Oral myiasis, larva infestation, gingival myiasis, Chrysomya bezziana

Introduction:

Myiasis is an infestation of a live vertebrate by dipterous larvae, which at least for a time feed on living or dead host tissue, liquid body substances, or undigested food (Gomez et al. 2003). The term myiasis was first proposed by Hope (1840) to refer to diseases of human originating specifically with dipterous larvae, as opposed to those caused by insect larvae in general, scholechiasis (Hope, 1840). Oral myiasis was however, first described by Laurence (1909) and is reported mainly in the tropics and is associated with, inadequate public and personal hygiene (Gursel et al, 2002). Myiasis can occur in the skin and mucosa by maggots from the families Cuterbridae, Hypodermatidae and a few Calliphoridae and Sacrophagidae species (Gomez et al, 2003). Based on degree of dependence on the host myiasis is classified as: (1) 'obligatory myiasis' where fly larvae are completely parasitic and depend upon the host for completion of their life cycle, and (2) 'facultative myiasis' where the fly larvae are free living and only circumstantially adapt themselves to parasitic dependence to a host (Dogra et al, 2009).

Case report:

A 12 year old girl reported to the out patient clinic of the Department of Oral Medicine & Radiology, People's Dental Academy in October, 2009. She presented with a history of pain and swelling in the gums in the maxillary anterior region since the past one week. The patient had initially noticed bleeding gums which rapidly progressed to a painful swelling. Small maggots were noticed from the gingival swelling since the past two days causing much alarm and discomfort to the patient.

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A physical examination revealed a moderately built and well nourished female with no known systemic disorder. All hematological parameters were within normal limits. An intraoral examination showed a mutilated labial gingiva in the region of the maxillary incisors with multiple fenestrations. The anterior palatal gingiva showed a poorly defined swelling measuring 1x2 cm. with exposure of underlying bone. Multiple larvae were noted crawling within the gingival lesion (Fig.I).

Fig.I: Photograph showing gingival wound with multiple larvae (Intra oral view).

The surrounding mucosa was inflamed and tender to palpation but bleeding and discharge was not evident. A provisional diagnosis of oral myiasis was made. Radiographic examination (Fig.II) a revealed diffuse rarefaction of the alveolar bone in the peri-apical region of the maxillary central incisors suggesting superficial erosion of the cortices. The floor of the nasal cavity was un-altered. A solitary well defined granuloma was appreciated in the peri-apical region of maxillary right central incisor. The wound was debrided under local anesthesia and the visible larvae were removed. Copious irrigation with physiological saline and povidine iodine was performed but primary wound closure was delayed. Under antibiotic coverage with oral penicillin, the patient underwent debridement for three consecutive days. When no further larvae could be isolated, wound closure was performed.

Fig. II: Maxillary occlusal radiograph showing rarefaction of the alveolar bone in the region of maxillary incisors. Well defined periapical granuloma in the region of maxillary right central incisor.

The larvae recovered from the wound were preserved in formaldehyde (40%). They appeared tapered in shape and creamy white in colour, their segments giving the appearance of transverse rows, with a brown-black tip anteriorly and were identified as larvae of Chrysomya bezziana (botfly) by an entomologist (Fig. III).

Fig. III: Photograph showing a solitary larva of *C.bezziana* with creamy white tapered body and characteristic transverse grooves.

Discussion:

Myiasis is caused by members of the Diptera fly family that lay eggs on food, necrotic tissue, open wounds, and unbroken skin or mucosa (Gomez et al, 2003). The myiasis can be obligatory, when larval flies (three stages) develop in living tissue, or facultative, when maggots feed on decomposing matter or necrotic tissues. Obligatory myiasis is more harmful for the host, particularly mammals (including man).Poor oral hygiene, ulcerated lesions, severe halitosis, and alcoholism are the pathological factors associated with it. Weak, senile, pediatric or mentally handicapped patients who are unable to defend themselves, and who often present with a lack of labial sealing, are attacked by flies and consequently by the disease (Gealh et al, 2009).

During its life cycle, adult fertile female flies are attracted by a wound's odour, feed on exudates, and lay eggs in the injured and necrotic tissues. After 12–24 hours (in summer) the first instar larvae hatch and enter the living tissues and feed for 5–7 days. In this period, the larvae moult twice and the third instar (last stage), after ceasing to eat, leaves the host and pupates inside the ground. In the next 1–2 weeks the adult fly emerges (Gomez et al, 2003). The preservation of the species of larvae is necessary for subsequent entomological identification.

The standard treatment options include maintenance of nutrition, antimicrobials for secondary infection and manual removal of larvae with or without topical asphyxiating drugs such as ether, chloroform, olive oil, turpentine oil that make the larvae to come out. Ivermectin given orally in just one dose of 150–200 mg/kg body weight and repeated after 24 hours has been reported to be effective in severe cases (Shinohara 2003). Recently a failure of the above dose has been reported with survival of larvae even after 5 days of therapy, finally requiring surgical debridement (Gealh et al, 2009). Since the larvae were already in the third instar suggesting a week old infestation, the effectiveness of ivermectin was questionable in our patient. Appropriate guidelines of ivermectin dosage in such cases are yet to be clearly established.

Of late, with the identification of prion rods in both fly larvae and pupae, transmission of prions by ectoparasites has given cause for much apprehension (Lupi, 2006). The prevention of human myiasis is, therefore, important and involves control of fly population, general cleanliness of dwelling areas and provision for basic sanitation and health education. Oral health care in pediatric patients must be given due emphasis.

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Case Report

Periodontal Plastic Surgery for Cosmetic Root Coverage: A Case Report

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Abstract:

Based on clinical observation that gingival recession may occur during orthodontic therapy involving sites that have an "insufficient" zone of gingiva, it is suggested that grafting procedure to be adapted to increase the gingival dimensions preceding the initiation of the orthodontic therapy. But once it is created, should be solved in appropriate way. We report a case treated for post-orthodontic gingival recession. The procedure involved the utilization of subepithelial connective tissue graft (SCTG) combined with coronally advanced flap procedure. At the post-operative follow-up visits the success of the surgical approach was confirmed by the absence of bleeding to probing and periodontal pockets as well as presence of gingival tissue with normal color, texture and contouring. After 12 months of follow-up, the clinical conditions were better than immediate post-operative result with satisfactory root coverage and periodontal health by the process known as creeping attachment. An excellent esthetical outcome was achieved and the patient was satisfied with case resolution.

Key Words: Peridontal plastic surgery, cosmetic root coverage, subepithelial connective tissue graft, gingival recession.

Introduction:

Gingival recession is defined as the location of the marginal tissue, apical to the cementoenamel junction (CEJ) with exposure of the root surface (Wennstrom, 1996). Localized gingival recession is an unesthetic condition that is usually observed over the labial aspect of prominent teeth and may be associated with root caries and hypersensitivity (Vekalahti ,1989). Many etiological and predisposing factors have been reported in the literature. It can be caused by traumatic injuries (excessive or inadequate brushing) and by destructive periodontal disease (Joshipura et al, 1994). Other predisposing factors may also play a role in recession development, i.e., tooth malpositioning, alveolar bone dehiscence, thin and delicate marginal tissue covering a nonvascularized root surface, high muscle attachment and frenal pull, occlusal trauma, lip piercing and iatrogenic factors related to reconstructive, conservative periodontologic, orthodontic or prosthetics treatment (Wennstrom & PiniPrato, 2006). Experimental evidence suggests that orthodontic tooth movement does not actually cause gingival recession but might create an environment that predisposes some people to the condition, particularly if teeth are repositioned in a facial direction and alveolar bone dehiscences are created (Wennström et al, 1987). Similarly, orthodontic tooth movement lingually or palatally will probably result in resolution of any alveolar bone dehiscences and an increased bucco-lingual dimension of gingiva on the facial aspect of the tooth. Widespread use of prophylactic gingival grafts to prevent recession in orthodontic patients has been reported (Vanarsdall, 1995) to augment bucco- lingual width of the gingiva, while some periodontist suggested wait and watch approach (Andlin-Sobocki & Bodin, 1993).

Once recession has occured, it needs to be covered for various reasons discussed above. Several techniques have been used including formation of a free gingival graft (FGG), laterally positioned flap (LPF) or coronally advanced flap (CAF) as well as guided tissue regeneration (GTR) and sub-epithelial connective tissue grafts (SCTG) alone or in combination with other techniques (Wennstrom & PiniPrato, 2006). This case report presents a case of post orthodontic gingival recession treated by subepithelial connective tissue graft surgery.

Case report:

A 16 year old girl reported to the Department of Periodontics with the chief complaint of unaesthetic appearance of her front lower teeth. On examination, it was found that 7mm class II gingival recession (Miller,1985) was there on the lower left central incisor (Fig.I). She had undergone orthodontic correction and was on retention appliance. Such type of recession was not present prior to the commencement of the orthodontic treatment. For the root coverage, periodontal plastic surgery was planned with sub-epithelial connective tissue free graft. Systemic

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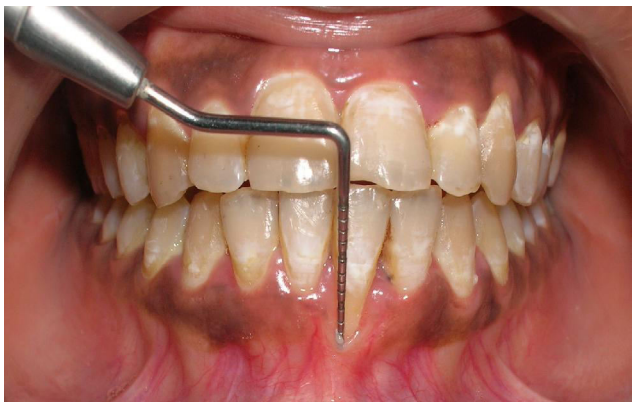

Fig:I Photograph showing 7mm of recession.

problems were ruled out before the surgery. Recipient site was prepared carefully with reflection of partial thickness flap. For this, two vertical incisions were given with the help of #15 blade, keeping in mind that recipient bed should be 3mm wide all around from the root surface (Fig.II).

Root surface was prepared with scaling and root planning without using any kind of root conditioner. After the preparation of recipient site, measurement was

Fig.II: Showing recipient bed preparation with partial thickness flap.

taken for donor tissue with the help of template made up of tin foil. Recipient site was covered with moist gauge piece. Donor site was selected for graft harvesting. Graft was removed from right palatal vault, 10 mm away from the gingival margin and just mesial to the first maxillary molar. Using a trap door approach, a template size sub-epithelial connective tissue graft was removed from the palate (Fig.III) kept in moist gauge piece and inspected for the size and thickness. Excess connective tissue and fat was carefully removed with the help of castroviezo scissor to make it 1.5- 2.0 mm thick. Graft was placed on the recipient site, stretched and stabilized with the help of horizontal suture (resorbable,vicryl, 5-0).

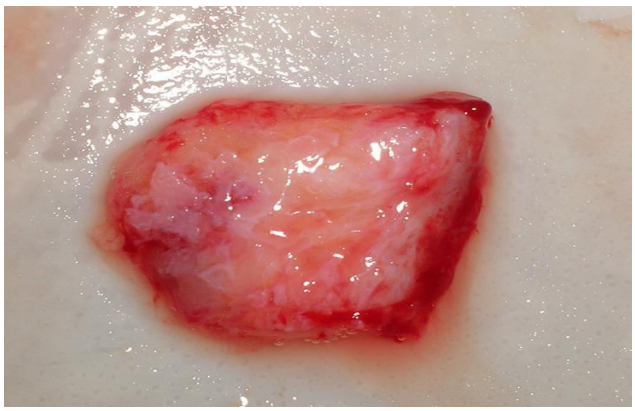

Fig:III: Showing subepithelial connective tissue graft.

All the four corners of the graft were sutured to underlying recipient tissue. After stabilization of the graft, pressure was applied on the graft for at least 5 minutes for close adaptation of the graft tissue and removal of blood clot, which may be present in between the donor and recipient tissue, to increase the possibility of graft acceptance. Now the reflected flap of recipient tissue was coronally repositioned and sutured with recipient tissue with sling suture (Fig.IV).

Fig. IV: Showing recipient site after graft placement and coronal positioning of the flap.

Periodontal dressing was placed on the recipient site. After suturing, the donor site was covered with the retention plate appliance , which patient was using. Post operative instructions were given to the patient and she was instructed to avoid brushing at surgical site for at least two weeks; medications were prescribed along with povidone iodine mouthwash. Follow up on tenth day revealed signs of graft acceptance (Fig.V). From donor as well as recipient site sutures were removed; oral hygiene instructions were reinforced. After 2 months, local examination showed that graft was completely accepted and recession was markedly covered with the graft tissue (Fig.VI). Donor site was

Fig.V: Surgical site after 10 days showing signs of graft acceptance.

completely healed. Patient was put on 3 months of recall period and after 12 months of follow up, further coverage of recession was noted by the probable process of creeping attachment (Fig.VII).

Fig.VI: Showing 75% recession coverage after 2 months

Fig.VII: Showing 85% recession coverage after 12 months by the process of creeping attachment.

Result and Discussion:

Immediately, after completion of the procedure, approximately 75% of recession was covered. After twelve months, coverage has become 85% by the probable process of creeping attachment.

The success of surgical procedures for root coverage depends on several factors, such as elimination and/or control of the etiology of gingival recession (Ando et al, 1999), evaluation of the inter-proximal bone level and choice for the most appropriate surgical technique, which are inherent to each clinical situation and region to be treated (Greenwell et al, 2000).

During the last two decades several periodontal plastic surgery (PPS) procedures have been described in an attempt to cover exposed root surfaces e.g., laterally positioned flaps, coronally advanced flap, free gingival grafts, subepithelial connective tissue grafts (SCTG), acellular dermal matrix allografts and guided tissue regeneration (Lindhe et al, 2006). However, the predictability of such PPS procedures may be associated with different conditions, especially the initial recession classification.

The optimal method of root coverage is based on recession etiology and activity and the patient's age, as well as esthetic demands. The most important factor determining treatment modality is the presence of appropriate (height and width) gingival papillas, which guarantees good vascular supply of the graft and creates the possibility of its proper placement to the Cemento enamel junction. Considering the various anatomic factors and socioeconomic status of the patient, SCTG technique was chosen for the root coverage procedure. SCTG was first introduced by Langer & Langer (1985) and modified by Harris (1992), Allen (1994) and Bruno (1999). It combines the advantages of the pedicle flap procedure and guarantees a double blood supply from both the overlying pedicle flap and the underlying periosteum. Other advantages of connective tissue graft is the good color match with neighboring soft tissues, less invasive palatal wound as well as long-term results in terms of root coverage.

Although all PPS procedures are effective in reducing the extent of exposed root surface, with a concomitant gain in Clinical attachment level (CAL) and in width of keratinized tissue but from an esthetic and subjective point of view, complete root coverage represents a desired treatment goal. A summary of published studies shows that on an average, 63-86% root coverage may be expected, depending on the treatment procedure used (Wennstrom & PiniPrato, 2006). There are many factors, which influence the degree of root coverage e.g., Patient related factors,

which include maintenance of oral hygiene, method of brushing and smoking; Site related factors, like interdental periodontal support and extent of recession (complete coverage is possible only in Miller class I and II recession, while in III and IV, only partial coverage is possible). In addition, in class II recession, the dimension of the recession also plays an important role in degree of root coverage. Less favorable treatment outcome has been reported at sites with wide (> 3mm) and deep (≥5mm) recession (PiniPrato et al, 1992; Trombelli et al 1995). In this case also since recession was deeper than 5mm, complete coverage could not be achieved.

Result after twelve months of surgery have shown better root coverage than immediately after the surgery. This may be possible by the process known as creeping attachment. It is a postoperative migration of the gingival marginal tissue in a coronal direction, covering areas of previously denuded root surface (Goldman et al, 1964). Although the dental literature is limited as to when migration stops, how it progresses, and the ideal point for evaluation but it has been frequently demonstrated in the literature, 6-8months postoperatively at the surgical site (Harris, 1997; Lee et al 2002).

In conclusion, surgical treatment using SCTG resulted in significant root coverage of class II recession and increased gingival width with good colour matching with the surrounding tissues.

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Case Report

Corneal and Conjunctival Intraepithelial Neoplasia – A Case Report

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Abstract:

A 65- year old male presented with a reddish mass in left eye with diminution of vision for past four months. Based on clinical examination, a probable diagnosis of ocular surface squamous neoplasia with mature cataract was made. Excision biopsy of the lesion demonstrated intraepithelial neoplasia involving cornea and conjunctiva. Post-operatively patient was put on topical mitomycin –C (0.01%) eye drops 4 times a day for 12 weeks. Cataract surgery was done in the same eye 3 months after cessation of topical Mitomycin-C (MMC) treatment. Follow-up was done for 18 months. Patient's vision improved to 6/9 in left eye.

Key Words: Corneal and conjunctival intraepithelial neoplasia, topical mitomycin C, cryotherapy.

Introduction:

The Corneal conjunctional intraepithelial neoplasm (CCIN) is an uncommon benign slowly progressive lesion with low malignant potential. Generally it occurs in the inter palpabral fissure, usually at the region of limbus, although it may be found elsewhere. Corneal conjunctional intraepithelial neoplasm may be associated with U-V light exposure, human papilloma virus infection, AIDS etc. Management of these lesions includes excision biopsy with adjunctive cryotherapy and topical mitomycin-C (Prabhasawat et al, 2005; Daniell et al, 2002, Sheilds et al, 2002). It is more aggressive and occurs at a younger age in patients with HIV.

Here we report the clinicopathological features of CCIN and results of using topical MMC after surgical excision of the neoplasm.

Case report:

A 65- year old male presented with history of a reddish mass in the left eye with diminution of vision for the past 4 months. On examination, there was a pink coloured papilliform mass of about 10mm x 12mm x5mm size present on the nasal limbus of the left eye along with involvement of adjacent corneal epithelium for about 3mm. Milky white cataract areas were seen in the pupillary area (Fig.I). His vision was reduced to just perception of light in left eye. Regional lymph nodes were not palpable. On the basis of clinical findings a diagnosis of CCIN with mature cataract left eye was made.

Excision biopsy of the lesion was done using a non-touch technique. During the entire surgery a dry field was maintained without balanced salt solution (BSS) irrigation to prevent tumour cell seeding (Fig. II). irrigation to prevent tumour cell seeding (Fig. II). The excised mass was sent for histopathological examination. Cryotherapy was applied to the margins of the remaining bulbar conjunctiva by the double freeze thaw technique. The conjunctiva was closed with 8/0 vicryl suture. Post-operatively patient was put on topical mitomycin-C (0.01%) eye drops 4 times a day for 12 weeks. Ocular irritation and conjunctival hyperemia was observed during the treatment period which disappeared spontaneously on cessation of MMC drops. There was no serious complication that necessitated stopping of the treatment. Cataract surgery was done in the same eye 3 months after cessation of topical MMC treatment (Fig.III). Total cure was achieved. Patient's vision also improved to 6/9 in left eye. The patient was followed up using slit lamp biomicroscopy for recurrence or any other ocular manifestations, every month for 6 months and then every 3 months for another 18 months.

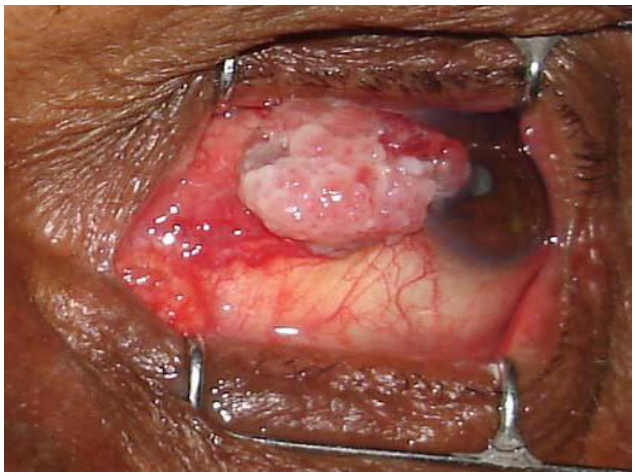

Fig. I: Clinical photograph showing a papillary mass on the nasal limbus of the left eye with mature cataract.

The histopathological study of excised mass was suggestive of conjunctival and corneal intraepithelial neoplasia (Fig. IV).

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Fig. I: Post operative photograph after excision of the neoplasm.

Fig. III: Post operative photograph after excision of the neoplasm and cataract.

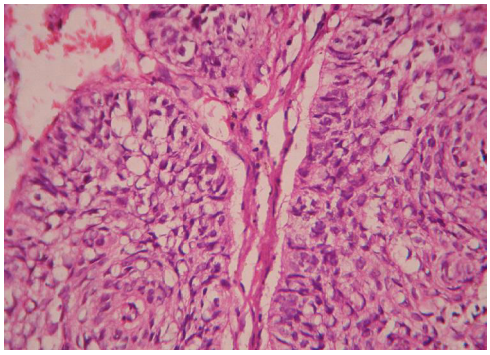

Fig. IV: Histopathological picture of the limbal mass showing conjunctival intraepithelial neoplasia.

Discussion:

Surgical excision of CCIN is associated with high rate of recurrence. It requires a non-touch specialized technique of excision to prevent recurrence. The tumour edges and deep margins are often difficult to determine. The tumour edges are often clear and avascular leading to a false sense that the tumour is smaller than it actually is.

Management of these cases is by surgical excision with cryotherapy and use of topical chemotherapeutic agents like MMC, 5 fluorouracil or interferon (Prabhasawat et al, 2005; Daniell et al, 2002; Sheilds et al, 2002; Boehm et al, 2004). Other researchers have successfully used combination of these treatment modalities (Huerva et al, 2006; Di Pasculae et al, 2002). Recent studies have shown a recurrence rate of approximately 50% when there is pathological evidence of residual tumour in the surgical margins and 5% to 33% recurrence rate with clear margins (Eeqenazi et al, 2005). Thus, management of these lesions is best done with combined therapy.

This patient was treated with excision biopsy with adjunctive cryotherapy and MMC drops for 12 weeks. This helped in controlling tumour margins and preventing recurrence.

MMC is a potent cytotoxic agent that inhibits DNA synthesis resulting in cell cycle arrest in the synthesis phase. Dudney & Malecha (2004) reported that although MMC is effective in eradicating CCIN, a limbal stem cell deficiency may complicate the treatment. Therefore, in an attempt to decrease the incidence of side effects, a relatively low concentration of MMC (0.01%) was used.

It is important to have a high index of suspicion for CCIN and to follow a specific protocol based management plan rather than subjecting the patient to incomplete or partial treatment which not only increases the chances of recurrence, but also makes subsequent management more complicated.

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Case Report

Mature Mediastinal Teratoma- A Rare Cause of Recurrent Respiratory Distress

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Abstract:

Teratomas are interesting because of their obscure origin,bizarre microscopic appearance and sometimes unpredictable behaviour.Although they occur infrequently in children, clinician should be aware of their clinical features, natural history, pathology and principles of treatment.In an attempt to document some of the features ,we report a case of an infant with large mediastinal teratoma presenting with severe and recurrent respiratory distress. Patient was operated successfully with no recurrence in 1 year follow up.

Key Words: Infant, Mature Teratoma, Mediastinal mass, Respiratory Distress.

Introduction:

The word Teratoma is derived from Greek words "terato" meaning monster and "onkoma" meaning swelling. A teratoma is a germ cell tumour derived from pluripotent cells and made up of elements of different types of tissue from one or more of the three germ cell layers.The world wide incidence of teratoma is about 1 in 4000 live births (Shetty et al, 2000). Frequencies of the most common sites are: sacrococcygeal 40%, ovary 25%, testicle 12%, brain 5% and others including neck and mediastinum 18 %

Thoracic masses arising from mediastinum are a common diagnostic dilemma in paediatric age group. These masses represent a wide variety of histological morphologies and require many different forms of surgical & non-surgical treatment. The choice of appropriate operative procedure depends on patient's age, tumour size, location, expansion, co-existent morbidity, cardiorespiratory reserve. Surgeon's experience gives a favourable outcome and long term prognosis (Zisis et al, 2005). Children especially those with benign tumours have very high survival rate after surgical resection (Grosfeld et al ,1994). Herein, we report a case of an infant who was diagnosed and treated for benign mediastinal teratoma with emphasis on it's clinical presentation.

Case report:

A 4 month old male baby weighing 5.43 kg was admitted in peadiatric emergency with complaints of low grade fever, cough and breathlessness for last 8 days. He had recurrent suchepisodes in the past, each of them lasting for 4-5 days since the age of 10 days. He was repeatedly treated by general practitioner as a case of pneumonia and given antibiotics along with steroids during each episode. On admission, physical examination revealed that infant was afebrile, cyanosed, having cushingoid facies with heart rate of 140/min. and respiratory rate of 70/min. His blood pressure was 60/40mm Hg in right upper arm. Oxygen saturation was 77% without oxygen on admission which increased to 89% with 3 litre/minute of oxygen. Systemic examination revealed marked intercostal and subcostal retraction; percussion note was impaired in infraclavicular and mammary region in right side with diminished air entry on right side and normal air entry on left side of chest. Rest of systemic examination was within normal limits. After clinical assessment, provisional diagnosis of pneumonia was made. Oxygen supple-mentation, intravenous fluid, intravenous antibiotics and bronchodilator were administered. His complete blood count electrolytes liver and renal function test were within normal limits. Arterial blood gas analysis showed PCO_2 of 26 mm Hg, PO_2 as 98 mm Hg and pH 7.4 suggestive of hyperventilation. X –ray chest (PA view) showed well defined homogenous rounded opacity on right side involving mid and upper zone causing mediastinal shift towards left upto the lateral chest wall (Fig.IA). Lateral view of chest revealed that the mass was extending anteriorly upto retrosternal space and posteriorly upto prevertebral space (Fig.1B). A tentative diagnosis of neoplastic mediastinal mass of unknown origin was made. The transverse section of contrast enhanced CT scan of thorax showed a large well defined, heterogeneous, hypodense mass measuring 9x7cm with multiple areas of calcification. The mass was causing compression over right main bronchus and displacing the mediastinal structures (Fig. II).

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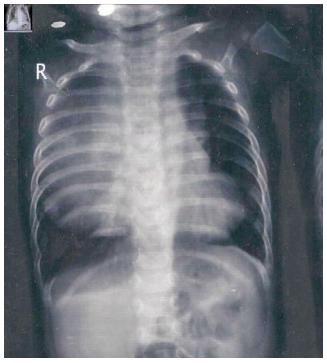

a) Postero-anterior View

b) Lateral view

Fig. IA & IB: Radiographies showing turnour mass originating from mediastium

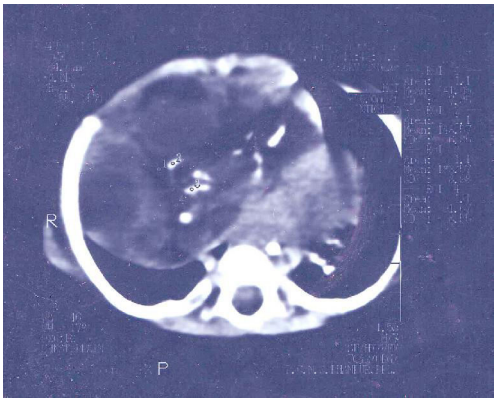

Fig. II: CT Scan showing hypodense mass with multiple areas of calcification.

Baby was operated on day 3 by pediatric surgeon. Through right lateral thoracotomy a large mass measuring 10x8x6 cm arising from upper part of anterior mediastinum was removed in toto and the pedicle was ligated. The mass was pushing the heart towards left side and right upper and middle lobes of lung were compressed. The child was ventilated electively for 12 hours.

The post-operative period was uneventful. X-ray chest on first post-operative day showed complete expansion of the right lung (Fig.III). He was discharged in stable condition on 12th post-operative day.

Gross examination of the resected specimen measured 10x8x6 cm and weighed 500 gms. It had a glistening capsule. On cutting the specimen a gritty sensation was felt. Cut surface had variegated appearance showing solid mucin filled cystic areas, haemorrhagic areas, cheesy pultaceous material and bunch of hairs (Fig. IV). Microscopically, multiple sections showed various mature tissues of three germ layers arranged haphazardly like intestinal mucosa, pseudostratified ciliated columnar epithelium , stratified

Fig.III: X-ray chest PA veiw on day 1 of Post Operative period.

Fig. IV: Photograph showing resected mass of teratoma.

squamous epithelium with adenexal structures like sebaceous glands, sweat glands, hair roots and keratin filled cystic areas. It also showed fatty tissue, cartilaginous tissue and neural tissue (Fig.V). These histopathological findings were consistent with "*mature teratoma.* At the 1 year follow up child is still healthy without any recurrence.

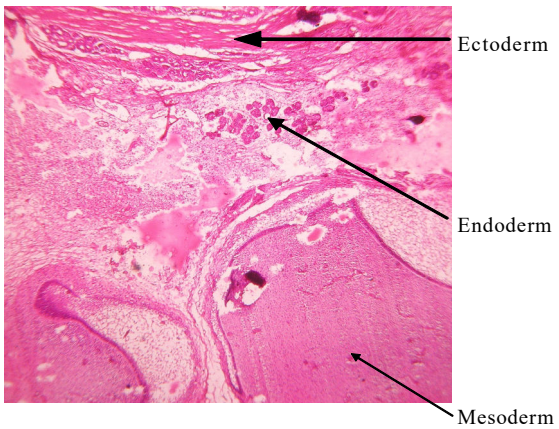

Fig. V: Microphotograph showing three germ layer.

Discussion:

The mediastinum is second most common site for teratomas in the paediatric population (Friedmann et al, 2003). Primary mediastinal teratomas account

for approximately 8-20% of mediastinal neoplasms (Lancaster et al, 1997). They are rare tumours in childhood accounting for only 7 % of all germ cell neoplasm (Lakhoo et al, 1993). Approximately 8% of mediastinal tumors are benign teratoma; 82% of these are in the anterior, 4% in the posterior and 14% in the middle mediastinum (Lewis et al, 1983).

Most of the symptoms due to mediastinal teratoma result from compression of adjacent structures (Savas et al, 2005). Our patient presented chiefly with respiratory problem consistent with other reports in the literature (Tansel et al, 2006). The most important factors affecting the management of a patient with a mediastinal mass are the nature of the disease, age, presenting symptoms & the location of the mass.

Almost all masses in the anterior mediastinum consist of lymph nodes,thymic masses,germ cell tumors or thyroid. So, the differential diagnosis include lymphoma, thymoma and bronchogenic cyst. Calcification (occasionally teeth) noted in a tumor as seen on chest X-ray & CT scan are consistent with the diagnosis of teratoma until proven other wise . In addition, thymic, bronchogenic, or pericardial cyst can also be differentiated sonographically by the presence of a thin wall in contrast to a teratoma which is always a thick walled cystic lesion (Wu et al, 2002). Microscopically, mesodermal, ectodermal and endodermal elements are seen in varying proportion. Pulmonary teratomas are mostly composed of mature, cystic, somatic tissue, although malignant elements may occur (Saini et al, 2006).

The surgical approach to these tumours has changed significantly over time. In the past, death was usually related either to the mass effect of the tumour or the complication of general anesthesia. With refinement in surgical technique & anesthetic management, the mortality rate has significantly decreased following surgical intervention. Mature mediastinal teratomas are benign, do not infilterate adjacent organs, and can be resected completely with good results (Chen et al, 2007). After complete resection of mediastinal cysts & benign tumors the prognosis is generally excellent. In a review of 153 children with nontesticular mature teratomas, the 6 year relapse –free survival for completely resected teratoma was 96%as compared to 55% for incompletely resected teratoma (Goblet et al, 1998).

Conclusion:

In early infancy, mature mediastinal teratoma can cause life threatening respiratory distress and therefore, should be considered in differential diagnosis of recurrent respiratory distress.

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Case Report

Prosthetic Management of an Ectodermal Dysplasia: A Case Report

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Abstract:

Ectodermal dysplasia represents a group of inherited conditions in which two or more ectodermally derived anatomical structures fail to develop. Early dental intervention can improve patient's appearance, thereby minimizing the associated emotional and psychological problem in these patients. Treatment requires a team work by medical personal along with dental professionals.

Key Words: Prosthetic rehabilitation, Ectodermal Dysplasia, Genetic disorder, Syndrome.

Introduction:

Ectodermal dysplasia (ED) is defined by National foundation for ectodermal dysplasia as a genetic disorder in which there are congenital birth defects of two or more ectodermal structures (Hickey, 2001). Thurman published the first report of a patient with ED in 1848, but the term was not coined until 1929 by Weech. Female carriers outnumber affected men but females show little or no signs of the condition (Pigno et al, 1996)

The syndrome involves overlapping features, thereby complicating a definitive classification. Lamartine in 2003 has described various well defined ectodermal dysplasia as Hypohidrotic (anhidrotic), Hidrotic (Clouston'syndrome), Ectrodactyly-ectodermal dysplasia-cleft syndrome (EEC), Rapp- Hodgkin Syndrome, Hay-Wells syndrome or ankyloblepharon ectodermal dysplasia.Usually the ectodermal dysplasia is divided into two types based on the number and function of sweat glands (Viera et al, 2007) as mentioned below:

- **Hypohidrotic (anhidrotic) Ectodermal Dysplasia (Christ-Siemens- Tourine Syndrome)**

In this form sweat glands are absent or significantly decreased. This disorder is usually inherited as either autosomal dominant / recessive or X-linked recessive trait and the gene locus is X q13-q21. It is commonly X-linked recessive with full expression in males. Female carriers have a minimal expression. 60-70% of cases usually show manifestations restricted to minimal hypodontia, aplastic or hypoplastic mammary glands, impaired lacrimal gland function, glaucoma and increased susceptibility to allergic disorders such as asthma or eczema. Typical general mental development, frontal bossing with characteristics reduction in amount of hair (hypotrichosis), absence of sweat glands (anhidrosis) resulting in temperature elevation, absence of sebaceous glands (asteatosis) resulting in dry skin, depressed nasal bridge, protuberant lips, prominent supra orbital ridges , sunken cheeks, wrinkled hyperpigmented skin around the eyes and large low set ears (Crawford et al ,1991).

The oral manifestations include conical or peg shaped teeth, hypodontia (partial absence of teeth) or complete anodontia (complete absence of teeth) of both the deciduous and the permanent dentition with malformation of any teeth that may be present, generalized spacing, underdeveloped alveolar ridges and delayed eruption of permanent teeth. Even when complete anodontia exists the growth of the jaw is not impaired. This would imply that the development of the jaws except for the alveolar process is not dependent upon the presence of teeth. However, since the alveolar process does not develop in the absence of teeth, there is a reduction in the normal vertical dimension resulting in the protuberant lips. In addition, in oropharynx the defect may be manifested as a high palatal arch or even a cleft palate. The salivary glands including the intraoral accessory glands are sometimes hypoplastic in this disease. This result in xerostomia, and the protuberant lips may be dry and cracked.

- **Hidrotic Ectodermal Dysplasia (Clouston Syndrome)**

Here the clinical features include nail dystrophy, hair defects and palmoplantar dyskeratoris. The patients have normal facies, normal sweating and no specific defect is seen.

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Case Report:

An 11 year old male patient reported in the Department of Prosthodontics with the chief complaint of lack of esthetics and difficulty in mastication. On general examination the patient presented with the classical triad of hypohidrosis, hypotrichosis and hypodontia. Apart from this, the patient presented with dry skin, depressed nasal bridge, protuberant lips, frontal bossing, sunken cheeks with prominent supraorbital ridges (Fig I) and palmoplantar dyskeratosis (Fig III).

Fig.I: Frontal & Profile view showing hypotrichosis, depressed nasal bridge, protuberant lips, sunken cheeks & frontal bossing with prominent supraorbital ridges

Fig.II: Palms & fect showing keratinisation.

Oral examination revealed (Fig. III) partial anodontia, hypoplastic peg shaped or conical teeth, generalized spacing and underdeveloped alveolar ridges.

The treatment option preferred was of a removable partial denture for the missing teeth. The carious teeth were restored and oral prophylaxis was performed. The peg shaped teeth were modified with composite resin which helped in enhanced retention of upper denture.

Fig.III: Intaoral view showing peg shaped teeth-hypodontia.

Alginate hydrocolloid (irreversible hydrocolloid) impression material was used for primary impression. This impression material was used because it is clean, biocompatible and pleasant for the patient. Its setting time is less so it causes less discomfort to the patient. It is an elastic material which is easy to remove from undercut area. Because both dentulous and edentulous areas had to be recorded accurately so dual impression was made (by border molding and final impression of the edentulous area and pick up impression by alginate for dentulous area) for both maxillary and mandibular arches (Fig.IV). After beading and boxing of the impressions, the cast were poured with improved die stone for greater strength and abrasion resistance (Fig. V). Jaw relation was done in the conventional manner. Teeth arrangement was done with resin teeth. After final try-in the waxed dentures were processed in a heat polymerized denture base resin. The complete dentures were delivered (Fig. VI) and the patient was instructed on the maintenance of oral hygiene and dentures. Recall appointments were done for adjustments.

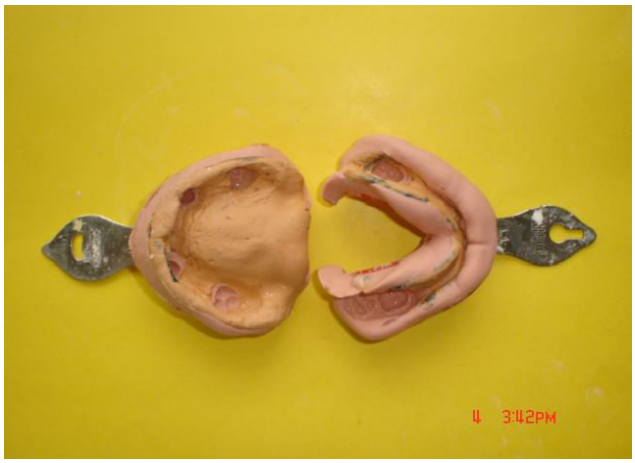

Fig.IV: Dual impressions of the maxillary and mandibular alveolar ridges.

Discussion:

Ectodermal dysplasia often involves overlapping features, thereby complicating a definitive classification. Some ectodermal dysplasia syndrome may be mild whereas others may be devastating. Diagnosis becomes difficult as the characteristic features are not obvious during birth, though during neonatal period there is extensive scaling of the skin

and unexplained pyrexia (Guckes et al, 1991). After diagnosis, the parents of the affected patient can be counselled regarding the treatment options available.

Fig.V: Final cast made up of die stone.

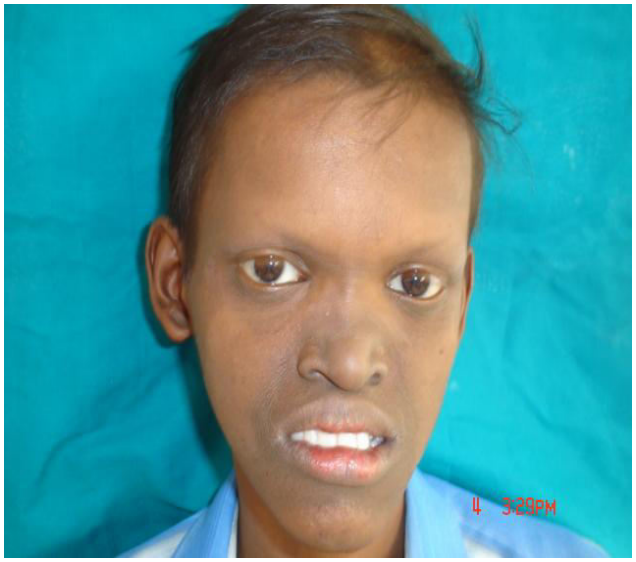

Fig.VI: Post operative appearance of the patient with maxillary and mandibular partial dentures.

An early age intervention helps to modify the intraoral prosthesis during growth spurts or rapid growth periods. Prosthetic intervention can be done with a child as young as 2 or 3 years if the child is cooperative (Hickey, 2001). This also allows the child to adjust with the prosthesis or appliance and develop normal appearance, speech, mastication and swallowing as well as temporomandibular joint function (Ellis, 1992). Apart from dental benefits, an early age intervention also provides psychosocial benefits. The unaesthetic appearance, poor self image, school/job related discrimination often accompanies ectodermal dysplasia syndrome which has a negative psychological effect on the patient. Thus management of the orofacial disfigurement provides the patient with some measure of confidence.

Treatment generally includes a removable and /or fixed partial denture, an overdenture, complete denture prosthesis or an implant retained prosthesis. In cases where there is associated cleft lip and palate the treatment may consist of intervention by a plastic surgeon and an oral and maxillofacial surgeon. In such cases a maxillofacial prosthesis may be indicated. In the present case prosthodontic management was done by removable partial denture. The option of complete denture was ruled out to preserve remaining alvealor ridges. Fixed prosthodontic management is seldom used for such type of patients because of minimal number of teeth present and often patient are young in which fixed partial denture with rigid connector will hamper active growth of dental arches. Options which could be considered in our patient were of overdenture after intentional root canal treatment of the existing teeth. But considering the increased number of appointments and disinterest of patient this option was also ruled out. The treatment option preferred was of a removable partial denture considering his present age. Moreover, considering the growth potential of our patient erupting tooth remained as potential overdenture abutment and an option for a fixed partial denture or implants in future.

As the child matures the removable prosthesis needs relining, rebasing or remaking to accommodate growth changes and maintain normal oral functions. When child reaches teenage years, orthodontic treatment may be indicated as better management of spacing may prepare the mouth for a fixed partial denture or implants in future.

In older patients, depending on pattern of missing teeth and the available bone support, osseointegrated implants can be used. If bone support is inadequate then bone grafting may be necessary. Overlay or overdenture may also be indicated as it involves retaining the tooth or tooth root after intentional root canal treatment.

Summary:

This clinical report describes the types, characteristic features and treatment options for a young male patient with ectodermal dysplasia. With proper care and prosthodontic treatment the patient

can enjoy a relatively normal life. The options for a definitive treatment plan may include fixed, removable or implant supported prosthesis, singly or in combination.

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Case Report

Implant with Simultaneous Bone Grafting for Replacement of Maxillary Anterior Tooth - A Case Report

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Abstract:

Successful replacement of the lost teeth by means of tissue-integrated implants represents a major advance in dentistry. The bone quality and amount of bone available in anterior maxilla is often variable and commonly there is a deficiency of bone volume. Currently, however, implants are also being placed in sites with ridge defects of various dimensions. The various reconstruction techniques using bone graft, guided bone regeneration, orthognathic surgery or bone distraction provides the surgical specialist with a wide range of treatment options for placing implants in compromised ridges. Appropriate use of these methods will enable the successful treatment of almost any complicated case with bone deficient jaws. This case reports the step-by-step procedures in a case where the missing maxillary left central incisor was restored by placement of implant simultaneous with the use of bone grafting using Hydroxyapatite for the correction of minor dehiscence in the alveolar ridge.

Key Words: Single tooth implant, ridge augmentation, HAP bone grafts, anterior tooth implant.

Introduction:

The rehabilitation of partial or total edentulism with dental implants has long become an accepted treatment in dentistry. The present surge in the use of implants was initiated in 1952 by Branemark who demonstrated that commercially pure titanium implants can be anchored to the jaw bone and used successfully for tooth replacement in edentulous arches. Since then osseointegrated implants have been used widely in dentistry to restore missing teeth. Osseointegration is defined as the direct structural and functional connection between ordered living bone and the surface of a load- carrying implant (Listgarten et al, 1991). Recently, there has been a paradigm shift in periodontics from the philosophy of saving teeth at all costs to one of extracting compromised teeth and replacing them with dental implants for a better and more predictable long-term outcome (Klokkevold, 2006).

The characteristics of the alveolar ridge play an important decisive factor in the success of implant placement. Currently, however, implants are also being placed in sites with ridge defects of various dimensions utilizing the various reconstruction techniques using bone graft, guided bone regeneration (Yeh & Hsu, 2003) orthognathic surgery or bone distraction (Block & Baughman, 2005). Here is the presentation of the step-by-step procedure in a case where the missing maxillary left central incisor was restored by placement of implant simultaneous with the use of bone grafting for correction of minor dehiscence in the alveolar ridge. A two-stage implant surgery was done wherein the first surgery was for implant insertion and the second surgery, several months later was done for uncovering the implant and attaching a prosthetic abutment (Maiorana & Santoro, 2002).

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Case report:

A 19 year old male patient reported to the Department of Periodontics, Government Dental College, Trivandrum, expressing the desire to replace his missing anterior tooth. The tooth 21was lost following a traumatic injury 9 months before (Fig.I-A).The patient was systemically healthy with good periodontal condition and oral hygiene. Clinical examination revealed the mucosa was firm and resilient with normal thickness. Thickness of the soft tissue was assessed at different points around the planned recipient site using transgingival probing.

Radiographic evaluation showed excellent periodontal condition of the remaining teeth, and there was adequate bone height and mesiodistal width for the placement of the implant. (Fig.I-B) The remaining bone was of good quality with sufficient bone density. The alveolar ridge was of type IV vide classification given by Hammerle et al (2004). The alveolar ridge has undergone substantial bone resorption labially since tooth extraction several months ago. These type of ridges can present with buccal dehiscence defect during placement of implants, which used to be augmented using grafting (Hammerle & Jung, 2008; Kahnberg, 2005).

(A) Frontal View

(B) Intraoral periapical radiograph

Fig.I: (A-B) Pre-operative Photograph.

A two - stage implant surgical procedure (using Frialit-2 implant system) was planned with simultaneous use of bone grafting to cover any dehiscence in the labial aspect that may appear during the placement procedure. After evaluating the clinical and radiographic findings, a stepped-screw implant of 13 mm length and 4.5 mm diameter was considered ideal for the site taking into consideration the fact that the tooth-implant distance should be greater than or equal to 3mm at the site (Quirynen & Lekholm, 2008).

Non-surgical periodontal treatment including scaling and polishing was performed 2 weeks prior to the implant placement surgery. Study models were prepared. Occlusal guiding stents were prepared with clear acrylic.(Fig.II-A). The prefabricated surgical stent was to be used to direct the implant placement in the correct angulation.

Surgical Procedures:

The surgical procedure was performed according to established guidelines for implant placement. (Adell et al, 1985; Lekholm & Jemt, 1989).

a) First surgical stage: After anesthetizing the surgical site using infiltration anesthesia, a full thickness (mucoperiosteal flap) was elevated following a horizontal incision on the palatal aspect of the alveolar ridge.

The flap was reflected to the labial surface to expose the underlying bone. Occusal opening in the prefabricated surgical stent allowed the surgical burs to be placed and angled correctly in the implant recipient site (Fig.II-A). The point of insertion on the bone was marked with the help of a round bur inserted through the occlusal opening of the stent.

This was followed by a the use of a 2mm spiral drill at a bur speed of 800rpm to 1000 rpm with copious irrigation with normal saline. The depth stop of all instruments was placed at 13 mm corresponding to the selected implant length. The 2mm spiral drill was taken to the predetermined depth followed by a 3 mm spiral drill which enlarged the opening along the angulations determined by the previous spiral drill. The recipient site was prepared to the final diameter (4.5mm) by using sequential drills of successive increase in diameters (Palmer et al, 2002).

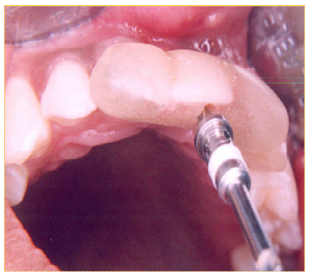
The implant was removed from the sterile packaging and placed in the prepared cavity with finger pressure & a mallet was used to gently tap the inserting instrument and the placement head until the implant fitted snugly and could be rotated into place (Fig.II-B). The placement head was removed and the placement instrument for the implant was inserted into the interhexagon of the implant and the rachet was placed into position. The implant was established into its final position by three full turns of the rachet.

After implant insertion, the corresponding color coded covering/healing screw was threaded into position and placement was verified with the surgical stent (Fig.II-C). Cover screws are used to protect the inner aspect of the implant during the healing period and they were placed in level with the surrounding crestal bone.

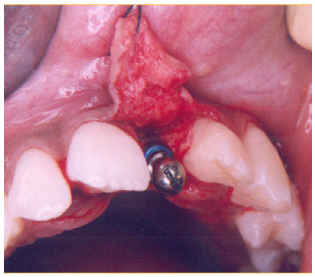
Bone Grafting: A buccal dehiscence defect at the most coronal aspect of the implant exposing a few threads of the implant was noted (Fig.II-C). After decorticating the labial bone with hand instruments, the graft (particulate hydroxyapatite bone graft/ HAP) mixed with blood from the recipient site was placed covering the dehiscence (Fig.II-D). The flap was closed over the graft and implant sutured using interrupted sutures. An immediate pos-toperative radiograph of the surgical site showed correct angulation and bone support around the implant. A temporary restoration was fabricated and used during the transitional period i.e. period of healing.

b) Second surgical stage:

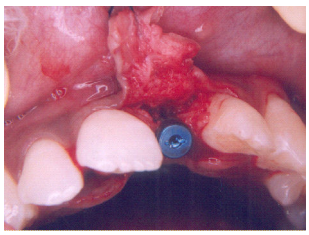
After a healing period of 5 months as advised in the classical Branemark 2 stage submerged protocol (Branemark et al,1969), a tissue punch was used to uncover the implant.



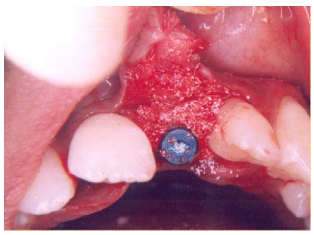
A. Occlusal guiding stent in place



B. Placement head in position

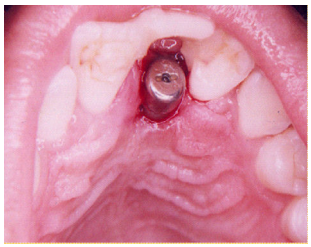


C. Dehiscence defect at the labial bone exposing a few coronal threads.



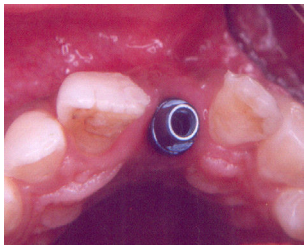
D. Bone graft placed to cover the defect.

Fig. II A-D: First Surgical stage.

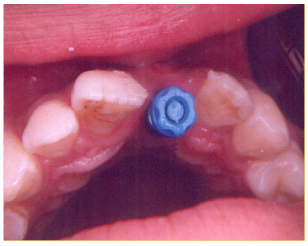


A. Gingiva former placed after punching

B. Normal healthy marginal tissue contour on removal of the gingiva former



C. Impression coping attached to the implant



D. color-coded transfer cap

Fig. III A-D: Second surgical stage.

The titanium covering screw was removed and replaced with a gingiva former which would enable the gingival margin to form properly during the healing period and ensure an ideal emergence profile around the future crown abutment (Fig.III, A-B).

The gingiva former was removed after healing of the gingiva (after 2 weeks) and replaced with a transfer coping, placed with a coping screw used for transferring the position of the implant exactly and reliably to the master model (Fig.III-C). Corresponding color coded transfer cap was placed over the coping (Fig.III-D). This allowed for the better transfer of the impression coping back into the impression.

Making of the impression: Impression was obtained with syringe material around the transfer coping and a heavy body material was placed in the tray for the rest of the dentition. The gingiva former was threaded back into the implant till the seating of the fabricated crown was to be done. The implant analog was united with the implant coping and secured with fastening screw. A good fit was verified by lining up the flats of the impression coping with the corresponding flats in the impression, the assembly was rotated and snapped into position in the impression and the master cast was poured and sent to the lab for crown fabrication.

The abutment screws were threaded into position in the implant after removing the gingiva former and the final restoration was cemented to the abutment (Fig.IV, A-B). The patient was kept on regular maintenance appointments during which the esthetics & functioning of the restoration was found satisfactory. A one-year postoperative radiograph showed maintenance of adequate bone level and density around the implant (Fig.IV-C).

A. Abutment screwed into position

B. Final restoration in place

C. 1 yr post-operative radiograph showing good bone support around the implant

Fig. IV- A-C: Post-operative photographs

Discussion and Conclusion:

Dehiscence defects may range from a very small lack of marginal bone to large areas of denuded implant surfaces. During implant installation surgery, minor fenestration or marginal dehiscence sometimes occurs. Hence some threads of the implants may be exposed (not covered by bone). In most cases, such uncovered threads may be left unattended since no adverse reactions have been observed in the mucosa of such locations (Lekholm et al, 1996). On the other hand, if the jaws contain defects of such a magnitude that the implants cannot be placed in proper position without having major parts of the bone exposed, a ridge

augmentation is often done using guided bone regeneration (GBR) or bone grafting. Here a grafting with particulate hydroxyapatite bone graft/ HAP (Allegrini et al, 2006), was performed to cover the defect and to level the minor deformity in the labial bone. Evaluation of porous HAP as grafting materials in implant sites have shown that porous hydroxyapatite bone graft enhanced bone formation and osseo-integration in the augmented sites (Quinones et al, 1997).

As long as the implant can be securely anchored in the existing bone, concomitant implantation and bone regeneration may be performed. Various technique including distraction osteogenesis, guided bone regeneration (Hermann & Buser, 1995) and bone grafting are being employed to assist implantation at the dehiscence sites. The available literature does not provide clear cut guidelines for a situation requiring bone augmentation and a situation without this requirement (Hammerle & Jung, 2008). Simultaneous placement of bone grafts and implants shortens the treatment time without increasing complications or reducing the success rate (Boronat et al, 2010).This case presents the successful restoration of the missing maxillary central incisor in a ridge with dehiscence, performed with two-stage implant surgery and simultaneous bone replacement graft.

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Review Article

Prosthodontic considerations in Parkinson's disease

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Abstract:

Parkinson's disease is a neurological disorder characterized by tremors, rigidity, bradykinesia and postural instability. The prevalence of this disease varies greatly throughout the world, though India has low prevalence but in Parsi community of Mumbai, its prevalence is 328.3 per 100,000. The incidence of disease increases with age. The physical disability of these patients compromises their daily activities including food intake and oral hygiene. Due to poor oral hygiene the extent of dental caries and edentulism increases therefore, the number of these patients attending dental clinic is increasing. This article reviews the clinical features, orofacial findings and the Prosthodontic management of such patients.

Key Words: Parkinson's disease, Saliva, Dentures, Implants.

Introduction:

Parkinson's disease (PD) is a neurodegenerative disorder affecting the adults in middle and late life. It is characterized by tremors, slowness of movements (bradykinesia), muscle rigidity, postural instability, gait disturbances and ultimately affecting their day to day life as described by James Parkinson in 1817, Parkinson's disease is caused by depletion of neurotransmitters, dopamine and nor-epinephrine in the basal ganglion.

The etiology of this disease could be as a result of combination of accelerated aging, genetic predisposition, exposure to pesticides or neurotoxins, head injuries or an abnormal oxidative mechanisms (Ciarrocca et al, 2003). This condition develops usually after 40 years of age or later. It affects both the genders equally, with an incidence of 1 in 100 over the age of 60 (Packer et al, 2009). Parkinson's disease starts slowly and is unilateral to start with. Mild stiffness and resting tremors are the early signs of the disease. There is a typical 'pill- rolling' movement between thumb and fingers the tremors spread to the legs, face, tongue and mandible. These patients show inability to initiate voluntary and involuntary movements (akinesia) and exhibit flexed posture due to rigidity (Allen & Lueck, 2002).

Patient's gait is often slow, shuffling with a stooped posture and they tend to walk faster with shorter steps. Many of these patients develop autonomic dysfunctions like variations in blood pressure specially orthostatic hypotension cardiac dysrhythmias, excessive sweating and bladder & bowl dysfunction.

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These patients may also develop sleep disturbances Certain behavioural disturbances like depression cognitive impairment and dementia may occur in these patients. Psychosis may develop due to dopaminergic medications (Friedlander et al, 2009). As this disease progresses the patient's ability to maintain his oral hygiene is hampered and chances of loosing teeth are more. Hence these patients need more help from the dentist and the care givers.

Orofacial findings:

Face of patients with Parkinson's disease has a typical "mask like" appearance due to reduction in the movements of the small facial muscles. The voice changes to soft, hurried, monotonus, mumbling and ultimately become whispering as a result of rigidity. The taste is altered because of medications and need more time to consume food, due to slow chewing movements, reduced tongue movements and difficulty in swallowing. Drooling of saliva from the corners of the mouth is followed by angular cheilosis, skin irritation and foul odour as a result of inability to swallow, close the mouth fully and anterior bowed head position. Bruxism, attrition and some cracked teeth are due to the orofacial musculature tremors and levodopa medications (Friedlander et al, 2009). Poor oral hygiene and xerostomia increases the chances of dental caries and periodontal diseases (Packer et al, 2009).

Burning mouth syndrome affects 24% of the Parkinson's patients. Burning sensation of the tongue, hard palate, floor of the mouth, lips, cheeks and edentulous alveolar ridge are noted, whether the patient is dentulous or edentulous, removable denture wearer or dentate subjects (Clifford et al, 1998).

Prosthodontic management: Before starting the treatment, the dentist has to consult the patient's physician for any modification in the treatment plan. An informed consent by the patient or caregiver has to be obtained. These patients should be scheduled for short appointments of less than 45 minutes early in the morning as the sysptoms are least bothersome 60 to 90 minutes after the administration of the drugs. Patient should empty his/her bladder to prevent urinary urgency and incontinence.

The dental chair should be raised slowly so that the patient is adjusted to the upright sitting position to prevent orthostatic hypotension. In some patients to prevent anxiety or frustration behaviour, the dentist has to identify himself each time, use simple words, short sentences and limit the use of face mask; smiling, direct eye contact and gentle touch may help. Patient's caregiver can sit next to the patient to reduce the anxiety. Relaxation and diversion methods can be implemented to reduce the stress (Corah et al, 1979). If the patient is uncooperative then intravenous sedation or general anesthesia can be given.

Patients of Parkinson's disease cannot keep their mouth open, there can be drooling of saliva and tongue and head movement may interfere with the treatment. To keep the mouth open, an extraoral ratchet-type prop or intraoral rubber bite block may help. To facilitate the patients swallowing, the dental chair can be inclined to around 45 degree and an aspirating tip can be placed under a rubber dam to aspirate the saliva.

Oral hygiene maintenance is compromised in these patients because of their impaired manual dexterity. Patients should be advised for tooth brushing, flossing methods and application of the topical fluoride if the patient cannot maintain his oral hygiene. If the patient cannot perform his oral hygiene then the instructions should be given to the caregivers (Friedlander et al, 2009).

Removable prosthesis: Patients of PD have difficulty in controlling and retaining the dentures due to tremors, rigidity of the orofacial musculatures and drooling of saliva. Therefore, the denture retention, stability and support are compromised. Impressions should be recorded with quick setting impression materials especially in severe form of PD. Patients being treated for complete denture, wax or compound should be used for recording jaw relations (as it registers instantaneously) after proper training. Patience and practice helps in improving the coordination. Jaw exercises are helpful. Neutral zone technique, flange technique and selective grinding of the occlusion (to remove the interferences) to obtain the maximum stability and retention of the dentures are useful techniques. If the patient has xerostomia (as a result of side effect of the drugs) then the dentist can take the opinion from physician for the change of drugs. Moisture based denture adhesives or artificial salivary substitutes can be prescribed depending on the patient's manual disability and xerostomia (Turner et al, 2008). The dentures should be fabricated by using metal denture base or high impact denture base resin. Patient's oral hygiene and denture cleanliness is to be followed efficiently. Denture cleansers can be prescribed for cleaning the dentures.

In removable partial dentures, the major connectors should not be of smaller design so as to prevent its aspiration and choking. Denture retainers should be designed for adequate retention. Precision attachments are not advocated as the patient lacks the necessary stable movement for insertion of the prosthesis. Flexible dentures (valplast), a recently available prosthetic material for removable partial dentures provide good retention and stability, but its effect on the tissue surface has to be studied.

Overdentures can provide better masticatory efficiency as compared to patient wearing conventional complete dentures. Abutments used for overdentures should be self cleansing. The metal copings should be cemented by using resin cement so as to reduce the microleakage. Magnets can be used for easy placement of these dentures.

Fixed partial denture: The margins of the preparations are to be kept supragingivally or equigingivally. Full coverage design is followed for maximum retention and resistance. Suction aids, and rubber dam are essential if there is drooling of saliva. An expanding vinyl polysiloxane gingival retraction material can be used for retraction of the gingival sulcus (Al Hamad et al, 2008). Over contouring may cause plaque accumulation, followed by gingival hyperplasia. If the patient has bruxism then resin fused to metal or gold bridge can be advocated. The contours and contacts of the pontic and retainers should be self cleansing. Resin cement should be used for cementation for fixed partial dentures as it reduces the microleakage.

Implant Surgery: Implant surgery and the required anesthesia appears to be the safe procedure. The quality of oral health and general health has improved by using dental implant supported prosthesis and is associated with marked increase in masticatory ability (Heckmann et al, 2000; Packer et al, 2009). Mandibular overdenture with magnetic attachment can be utilized as it is easy for insertion by the patient or by the caregiver (Chu et al, 2004).

Depending on the patient's physical disability, intravenous sedation or general anesthesia can be administered. Local anesthesia containing epinephrine must be cautiously administered if the patient is treated with levodopa and entacapone, as it may lead to an increase in blood pressure and heart rate. Epinephrine of less than 0.05 milligram appears to be safe as is found in three cartridges of 2% lidocaine with 1:100,000 epinephrine per 30 minutes period, with careful aspiration to avoid intravascular administration. Monitoring of the patients vital signs are mandatory. Dentist should be careful when prescribing erythromycin and ampicillin, as they are known to interfere with biliary excretion. Meperidine hydrochloride should not be given with Monoamine oxidase inhibitor (MAOI), selegiline and rasagiline as it leads to toxic interactions like hyperthermia, hypertension and tachycardia. Monoamine oxidase inhibitor potentiates the action of narcotic drugs. Therefore, if narcotic drugs are to be added then they should be given in half the dose.

Conclusion:

Parkinsonism is a disease which affects the muscles of the face, tongue, palate and pharynx and limits the treatment planned to assist mastication, deglutition, speech and esthetics. The disease should be identified and the treatment should be started at an early age as the disease is progressively debilitating. Proper education and motivation is equally important for these patients and the caregiver regarding the prosthodontic treatment.

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